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A COMPARATIVE STUDY OF TWO PRESCHOOL PROGRAMS FOR CULTURALLY DISADVANTAGED CHILDREN--A HIGHLY STRUCTURED AND A TRADITIONAL PROGRAM.

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THIS STUDY REPORTS THE FIRST PHASE OF A 5-YEAR LONGITUDINAL INVESTIGATION OF THE COMPARATIVE EFFECTIVENESS OF A HIGHLY STRUCTURED PRESCHOOL PROGRAM AND A TRADITIONAL NURSERY SCHOOL PROGRAM IN AMELIORATING THE LEARNING DEFECTS OF CULTURALLY DISADVANTAGED CHILDREN. THE HIGHLY STRUCTURED PROGRAM IS INTENDED TO OVERCOME PARTICULAR WEAKNESSES OF DISADVANTAGED CHILDREN, WITH PARTICULAR STRESS PLACED ON LANGUAGE SKILLS. THE 55 SUBJECTS WHO TOOK PART IN THE 2-MONTH STUDY WERE SELECTED FROM LOW SOCIOECONOMIC HOMES AND WERE ASSIGNED TO CLASSES IN SUCH A WAY THAT EXPERIMENTAL AND CONTROL GROUPS WERE MATCHED IN IQ, SEX, RACE, AND SOCIOECONOMIC STATUS. THE SUBJECTS WERE PRE- AND POSTTESTED WITH THE STANFORD-BINET INTELLIGENCE SCALE, THE ILLINOIS TEST OF PSYCHOLINGUISTIC ABILITIES, THE PEABODY PICTURE VOCABULARY TEST, AND THE FROSTIG DEVELOPMENTAL TEST OF VISUAL PERCEPTION, AND WERE POSTTESTED WITH THE METROPOLITAN READINESS TESTS. COMPARISONS INDICATED THAT (1) EXPERIMENTAL SUBJECTS SHOWED SIGNIFICANTLY GREATER PROGRESS IN MEASURED IQ, (2) OVERALL PROGRESS IN PSYCHOLINGUISTIC ABILITIES WAS ESSENTIALLY THE SAME FOR BOTH GROUPS, (3) THE CONTROL GROUP SHOWED SLIGHTLY HIGHER VOCABULARY GAINS, ALTHOUGH THE GROUPS DID NOT DIFFER SIGNIFICANTLY, (4) THE EXPERIMENTAL GROUP SHOWED GREATER GAINS IN VISUAL PERCEPTUAL DEVELOPMENT, AND (5) THE EXPERIMENTAL GROUP SCORED SIGNIFICANTLY HIGHER IN EACH AREA OF THE READINESS TESTS. THESE RESULTS SUGGEST THAT THE HIGHLY STRUCTURED PROGRAM IS MORE EFFECTIVE, BUT FINAL EVALUATION MUST AWAIT THE EVALUATION OF THE PERFORMANCE OF THE SUBJECTS IN SCHOOL. (DR)

A Comparative Study of Two Preschool Programs for Culturally Disadvantaged Children: A Highly Structured and a Traditional Program

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CONTENTS

Chapter I

Problem

The failure of the culturally disadvantaged to develop their capabilities should be viewed from the standpoint of the loss to society as well as from the standpoint of its effect on the individual. Presently the United States is permitting some one-third of its human resources to go to waste. These are the individuals who come from the lower socioeconomic level. The only hope this country has of meeting the increasing manpower shortage in the highly trained fields is to recruit more individuals from the lower socioeconomic level.

A high percentage of school dropouts and delinquents comes from disadvantaged homes, and these persons have, in most cases, records of learning disabilities, school failures, and retention dating back to the early primary grades. These individuals seem to be dissatisfied with school and with life in general and contribute minimally and often negatively to society. While all culturally disadvantaged youths are not school dropouts and delinquents, their culture predisposes them to find school difficult, to lack self-confidence, to have low self-concepts, and to be generally alienated from the mainstream of our culture. Research has provided further descriptions of the rather specific learning deficits of these children. The disadvantaged score lower on intelligence tests, as much as five to 25 points lower than their more advantaged peers. It is also recognized that there are gaps in the knowledge and learning of these children. They are deficient in listening skills, in visual and auditory perception, and have short attention spans. Perhaps the area that sets them apart more than any other is inadequate language development of a more formal nature.

It is generally agreed that the best strategy for winning the "war on poverty" and combating the cumulative effects of cultural deprivation is through education.

> The possibility of arresting and reversing the course of intellectual retardation in the deprived pupil depends largely on providing him with an optimal learning environment as early as possible in the course of his educational career. (Ausubel, 1966, p. 237)

Thus, it would seem that preschool programs for the culturally disadvantaged are a necessary intervention to compensate for the lack of a wide range of environmental stimulation in the home and neighborhood. Such programs should require "incorporation, accommodation, adjustment, and reconciliation" (Ausubel, 1965, p. 46) and would enable the disadvantaged to ameliorate learning deficits before they become firmly entrenched. The longer the intervention is delayed, the greater the impact of the deficient learning environment is on the cognitive development of the disadvantaged. Lack of opportunities to learn causes the disadvantaged to fall farther and farther behind. The longer the intervention is delayed, the more drastic it must be to compensate for and ameliorate the deficits that have accrued. By the time of adolescence and early adulthood, it is almost impossible to make up these losses in learning.

Research conducted on preschool children from middle- and upper-class homes does not support the contention that preschool attendance is indispensable to their subsequent adjustment and educational progress in the kindergarten and first grade. Special educational provisions for preschool children with special problems, however, have achieved positive effects on the growth of these children. Currently, the important question to be answered is not whether culturally disadvantaged children profit from preschool education but rather, "What approach to preschool education will promote the

greatest growth in disadvantaged children?"

It is not enough for a preschool to foster positive changes in the culturally disadvantaged. To keep pace with their middle-class peers in subsequent years, these children must show an accelerated rate of intellectual development during the preschool years to enable them to "catch up." Ausubel (1965) supports this premise:

> Although the possibility of accelerating movement through the stages of intellectual development is at best highly limited, the acquisition of many intellectual achievements that lie within intrinsic readiness of children can be accelerated by providing suitable contrived experience geared to their cognitive capacity and mode of functioning. Age of readiness for a given intellectual task, after all, is not an absolute but is always relative, in part, to the method of instruction employed. (p. 56)

The problem of this study is how to compensate for and ameliorate the learning deficits of four-year-old culturally disadvantaged children and how to accelerate their rate of growth in areas that will enable them to cope more successfully with the school tasks of first grade. The specific problem is the evaluation of two approaches for such compensation, amelioration, and acceleration. One approach is to provide a highly organized and structured preschool program. An instructional model is used as a guide in helping children process information in content areas and in ameliorating the deficits delineated by a careful psycho-educational study of each child. The other approach is to provide a more traditional nursery school program where socialization is one of the major goals and where learning takes place in a less structured, incidental, and informal manner.

Chapter II

Review of Related Research

This chapter attempts to review research reports from 1925 to 1965 that seem to be relevant to this research project. Many programs with preschool culturally disadvantaged children are in process, but for the most part these programs have not been set up on a research basis or have not been in operation long enough to be evaluated. Few studies have included both Negro and Caucasian children with a wide range in intelligence. Much of the research focusing on amelioration of learning deficits has concentrated on exceptional children with mental or physical handicaps. The effects of preschool programs have been assessed in terms of changes in measured intelligence only rather than changes in a number of crucial aspects of development related to learning.

As early as 1925, Wooley reported positive gains in mental growth as a result of preschool education. A weakness of the study was the lack of a control group. Two other researchers, Barret and Koch (1930), also found positive gains in mental growth in their study with a small number of children in an orphanage. Hildreth (1928) and Goodenough (1928) made similar investigations and obtained negative results; they severely criticized earlier studies for weaknesses in research design.

While the studies on preschool children conducted at the University of Iowa (Stoddard et al., 1940) have been criticized, largely on the basis of methodology, they did focus on a crucial problem--the effects of environment on intelligence. "It is to the credit of the Iowa group of investigators that they maintained a persistent interest in the possible effects of nursery education and formulated an extensive and versatile program of

research." (Jones, 1954)

Goodenough (1939) and McNemar (1940) were skeptical of the findings that indicated that the Iowa experimental groups, provided with a stimulating preschool experience, made substantial gains on measures of intelligence. McNemar even reanalyzed the data of Skeels, Updegraf, Wellman, and Williams (1938) and discovered that the number of subjects was inflated because an individual might be counted more than once in a case-count. Using the reduced number in his analysis of the data, McNemar found no statistically significant differences between the experimental and control groups. Wellman, Skeels, and Skodak (1940), in retort to McNemar's criticism, reanalyzed the data on ten of the children attending preschool and eleven of the control subjects whose initial IQ's were 80 or below. They found that experimental subjects who attended 400 or more days of nursery school had an average gain of 8.2 IQ points and the controls, 4.2 IQ points. This difference, however, did not prove to be statistically significant.

Another study conducted by Wellman (1940), comparing fall and spring test scores of 34 preschool children who attended the Iowa Child Welfare Research Station nursery schools with the scores of 34 children in the community who received no schooling, revealed that after one year in school the experimental group showed an average IQ gain of seven points while the control group regressed 3.9 points. One confounding variable was that the parents of the two groups were not comparable. According to the findings of Honzik et al. (1948), a regression factor could have accounted for at least a portion of the gain in the experimental group as well as a portion of the loss in the control group.

Jones (1954) pointed out some of the weaknesses of these early studies. Researchers often failed to maintain a control group matched on certain

crucial variables. Usually they did not consider the education, intelligence, and socioeconomic status of the parents. Matching pupils merely on the basis of IQ does not insure homogeneity. Conditions during the initial testing were not always comparable. Jones explained that, since the experimental children were initially tested in the unfamiliar setting of the school and the controls in their homes, the gains made by the experimental group might be attributed more to an increased rapport with the testers in a setting which was no longer unfamiliar, rather than to actual growth in intelligence. Treatment programs were not always described in adequate detail. Another criticism concerned personnel administering the tests. If testers were unknown to the control group but were teachers or other staff members well-known to the experimental group, differential gains may have resulted from such uncontrolled variables rather than from the treatment program. Preschool studies were not generally longitudinal to determine if gains were permanent. In summarizing a discussion of the effects of preschool education, Jones (1954) said:

> It is quite reasonable to expect some IQ gains among children released from a static or unstimulating environment, whether this release is provided by a school, a foster home, or other environmental change. (p. 682)

In examining research on the effects of preschool education through the year 1939, Goodenough (1940) concluded that the results of studies attempting to demonstrate the differential effects of various kinds of preschool practices upon the achievement of children were disappointing, even when suitable controls were used.

The need for studies investigating the relationship between aspects of a preschool program and IQ changes was recognized. Wellman and McCandless (1946) studied the various facets of a preschool educational program which seemed to be related to IQ gains, but the results tended to be inconclusive.

There has been a series of studies of intelligence as related to social class which have implications for the education of culturally disadvantaged children. Herrick (1951) compared the intelligence test scores of children whose parents belonged to the professional class with those of children whose parents were unskilled laborers and found the scores of the latter to be from 15 to 25 points lower. Janke and Havighurst (1945), using Warner's scale of economic status, found similar results. Other studies, such as Havighurst and Breese (1947); Manley (1963); Hindsley (1961); and Migliorino (1960), found a significant relationship between socioeconomic status and intelligence scores.

Boger (1952) investigated the effect of perceptual training on California Mental Maturity IQ scores of elementary age children (grades 1-4). Stimulating visual materials that required reasoning ability were provided to twenty-five rural white pupils and twenty-nine rural Negro pupils. Both groups made significantly greater gains on the group IQ tests than did the control subjects.

Kirk (1958) reported a carefully conducted study using an experimental and control design which involved a special program for preschool disadvantaged children (ages 3-6) with IQ's between 45 and 80. Experimental preschools were conducted in the community and in an institution for the mentally defective. The controls for the community experimental group remained in the home without the benefits of school. The control group for the institutional experimental group remained in an institution but was not provided with a preschool educational program. The overall gains of the two experimental groups over the control groups were statistically significant. The gain in IQ scores of 70 percent of the children in the experimental preschools was from 10 to 30 points; however, the remaining 30 percent did

not gain in IQ points. These findings imply a need for testing other methods of accelerating the rate of mental growth of the children who failed to profit from this program.

Gray and Klaus (1963) studied the effect of early training on preschool culturally disadvantaged children. The primary purpose of the study was to offset the progressive retardation commonly observed in the schooling of culturally disadvantaged children. The researchers attempted to promote motivation for achievement, to stimulate language development, and to provide experiences which would encourage the child to order and to classify the objects and events in his world. The experimental subjects consisted of two groups of twenty culturally disadvantaged Negro children. One group attended a preschool for two consecutive summers, the other group for one summer. Over a fifteen-month period pre- and posttests revealed a significantly greater improvement for the experimental groups on the Stanford-Binet Intelligence Scale and the Peabody Picture Vocabulary Test. The experimental groups made average gains of 10.1 after two summers of attendance in a program and 5.1 IQ points after one summer. The scores of the control groups on the other hand showed average decreases of 5.1 and 2.5 over the same span of time.

Weikart (1964) in his progress report on the Perry School Project stated that the purpose of the study was to compensate for mental retardation associated with cultural deprivation. Essentially, his program was a cognitively oriented morning program using an instructional method which he refers to as "verbal bombardment." In the afternoon, home visits were made in an effort to involve mothers in the instruction of their children. Group meetings were held with mothers and fathers. His controls remained at home without the benefit of a preschool program or home visitations.

The Weikart project involved several groups provided with the same treatment to obtain sufficient numbers for a longitudinal study. Each year a new pair of three-year-old experimental and control groups were added to the larger project. These groups were referred to as "Wave 0," "Wave 1," and "Wave 2." At the time of the report, Wave 0 children, who started at age four, had spent two years in preschool and were in first grade. Wave 1 youngsters had spent two years in nursery school and were in kindergarten. Wave 2 children had completed a year in nursery school and were in their second year of nursery school. There was a spurt in Binet IQ during the first year the experimental children attended the special preschool. In that year, Waves 0, 1, and 2 made mean IQ gains of 12.8 points (at age four); 11.5 points (at age three); and 20.3 points (at age three). During the second year two of the experimental waves experienced losses in IQ points (2.1 and 1.5). The staff of the Perry Project felt that these losses indicated a need to strengthen the curriculum.

The findings on the Peabody Picture Vocabulary Test suggested that a preschool program does promote the development of "verbal intelligence." Differences between the experimental and control groups of Wave 1 and Wave 2 were significant at the .10 level in favor of the experimental group. Wave 1 and 2 control groups lost a few points. An analysis of data on the Illinois Test of Psycholinguistic Abilities (ITPA) revealed that the Wave 1 experimental group scored higher on seven of the nine subtests; on two subtests, Auditory-Vocal Association and Motor Encoding, these differences reached statistical significance. The performance of Wave 2 experimental subjects was significantly superior to that of the control on the Auditory-Vocal Association subtest. At the end of the kindergarten year, the subjects were given the Gates Reading Readiness Test. The experimental subjects tested

higher than the control on all five of the subtests; however, the results of only two, Picture Directions and Word-Card Matching, reached statistical significance.

Weaver (1963) conducted a study with culturally disadvantaged Negro children at the preschool level to determine their psycholinguistic patterns and to evaluate a preschool training program designed to accelerate language development. The experimental subjects attended a preschool while their controls remained at home. The experimental subjects had significantly higher scores on the Visual Decoding and Auditory-Vocal Association subtests of the ITPA. They also scored higher on the total language score.

Smith (1962) reported a study using the ITPA with mentally retarded children. He provided three 45-minute periods a week of intensive remediation to groups of eight children in the nine areas assessed by the ITPA. His purpose was to evaluate the effectiveness of this language program. During the 33 sessions, the experimental group gained 6.75 months in mean language age and the control group decreased .44 months. Some twelve months later, Mueller and Smith (1964) conducted a follow-up of Smith's subjects and found no statistically significant differences between the two groups on the ITPA.

Wiseman (1965) investigated the effects of a remedial program on mentally retarded boys with psycholinguistic disabilities. One of the questions he attempted to answer was, "To what extent will performance in psycholinguistic abilities be modified by remediation?" He found that the experimental group exceeded the control group on eight of the nine subtest gain scores at the .02 level of significance. The performance on the representational level subtests seemed to improve at a greater rate than performance on automatic-sequential level subtests. He also found that training in areas of psycholinguistic disability appeared to have some effect on other cognitive and perceptual abilities, although the differences in IQ gain between the experi-

2. Both the comparison and experimental groups had treatment programs. Earlier studies customarily provided no treatment program for the control subjects.
3. Changes in a number of variables were investigated. Earlier studies concentrated primarily on IQ changes.
4. This study is longitudinal in nature, in contrast to earlier short-term studies.
5. The subjects of this study were not chosen from a narrow range of intellectual ability as has been true of many earlier studies.
6. Most earlier studies with culturally disadvantaged children have used the ITPA as an achievement test. This study uses the ITPA as an achievement test and as a diagnostic instrument.
7. The instructional program has been recorded and can be replicated.
8. Both Negro and white children made up the subject population.
9. Parent involvement was kept to a minimum to enable a more precise evaluation of the instructional program.

Chapter III

Theoretical Orientation and Hypotheses

Theoretical Orientation

The importance of early stimulation and the adverse effects of deprivation in the early years upon a child's ability to cope with intellectual tasks and upon his subsequent school achievement have been well documented. However, bombarding experientially deprived children with stimulation is not sufficient to overcome the intellectual and academic disabilities they have acquired as a result of their membership in a subculture where cognitive abilities are neither carefully cultivated nor strongly admired. Their handicaps involve not only learning deficits but basic motivational liabilities, for learning how to learn has not been, for them, a challenging or rewarding activity.

Hunt (1964) has pointed out that a young infant living under conditions of cultural deprivation may, indeed, not lack environmental stimulation. He writes:

> Although there is no certainty of this, it is conceivable that being a young infant among a large number of people living within a room may actually serve to provide such wide variations of visual and auditory inputs that it will facilitate development more than will the conditions typical of the culturally privileged during most of their first year. (p. 238)

Hunt goes on, however, to depict the less fortunate state of affairs likely to follow during the second, third, and ensuing years of the child's life. As the child begins to walk, he is likely to get in the way of adults already made ill-tempered by their own discomforts. The activities of a child under such conditions are likely to be sharply curbed. Similar thwarting

occurs when the child begins to talk. Hunt comments:

> The variety of linguistic patterns available for imitation in the models provided by lower-class adults is both highly limited and wrong for the standards of later schooling. Furthermore, when the infant had developed a number of pseudo-words and has achieved the "learning set" that "things have names" and begins asking "What's that?" he is all too unlikely to get answers. Or, the answers he gets are all too likely to be so punishing that they inhibit such questioning. (p. 238)

Such a state of affairs adversely affects not only intellectual development but motivational development as well. Culturally disadvantaged children need stimulation, but educators must help these children find learning interesting, worthwhile, and rewarding. There is reason to believe that the intellectual and motivational stunting of early cultural deprivation can be reversed to a considerable degree by supplying proper experiences in a nursery school for young children of three, four, and five.

Let us discuss the first task: to provide stimulation for intellectual growth. Incidental learning in a preschool can and does occur; but if one knows the conditions which best promote the acquisition of desired skills, it seems wasteful and perhaps even irrational to depend upon incidental learning to transmit these skills to the child. An environment of optimal learning conditions requires a program which is <u>highly structured</u>. Such a program must provide the child with what Hunt (1964) terms the "proper match." Learning activities must be designed, on the one hand, to be appropriate to the present cognitive structures of the child, but, on the other hand, the activities must develop these structures even further. If the child is to obtain maximum benefit from his educational experiences, the importance of structuring learning situations to insure this proper match cannot be overemphasized.

Proper stimulation also includes sufficient opportunities to repeat

newly acquired responses so that these responses will become established. Frequent review is scheduled at later intervals to insure overlearning. All educators realize the importance of transfer of training. Indeed, one of the goals of our educational enterprise is to help youngsters learn skills of reasoning and thinking that will be effective not only in an educational setting but also in areas of intellectual endeavor outside the confines of the classroom. To teach children basic modes of thinking which can be used effectively in many areas requires detailed and precise mapping of the content areas within which these processes are taught. Scheduling learning activities in content areas to overlap and extend each other demands a highly structured curriculum. Cognitive modes, such as inductive and deductive reasoning, can be taught incidentally, but if adequate repetition and conditions facilitating transfer are to be included in the learning experiences, the curriculum must be minutely specified.

The second major task of the educator working with the culturally disadvantaged is developing motivation conducive to good learning. A child can be torpedoed with stimulation, but if he finds no interest, reward, or challenge in attempting to order, act upon or process this information, neither he nor society is any better off for this supposedly enriching experience. Optimal achievement requires optimal motivation. The whole area of motivation remains one of debate among psychologists and endless frustration for teachers; yet, effective guidelines exist for those who are seriously interested in building them into a curriculum. Modern experimental research and learning theory have served to refine the layman's observation that "Nothing succeeds like success." We know the importance of immediate feedback of results. The child who knows at once the appropriateness of his response will be more willing to accept the next challenge than the child who

is far into the next activity before he knows how well he has mastered the previous one. Immediate feedback of performance, then, should be woven into a highly structured program not only for more efficient learning but also for the facilitation of motivation. In addition, desirable learning and motivational habits can be promoted through the provision of a high success ratio when presenting new and difficult material. Such a ratio can be achieved only by carefully sequencing the responses required; again, a highly structured curriculum best accomplishes this objective.

The motivational task of education is to make learning its own reward. Motivation may take extrinsic forms, such as recognition, reward, and commendation. These reinforcement proce res can eventually operate to make learning itself highly rewarding, a state of affairs referred to by Hunt (1964) as intrinsic motivation. When a child finds the act of learning reinforcing of itself, then, as Hunt points out, motivation is inherent in the very act of processing information, surely one of the objectives of a good curriculum.

The nature of teacher-child interaction can help to overcome motivational deficiencies. Culturally disadvantaged children can be an irritation to the teacher who holds middle-class values, and such a teacher may be negative with these children. If optimal learning conditions are to be created, the teacher-child interaction must be a firm but pleasant one. In most instances, this is best accomplished by ignoring undesirable behavior whenever possible and rewarding desirable behavior. Punishment usually accomplishes little and frequently is detrimental to the promotion of adequate learning and motivation.

One last aspect of the theoretical orientation of this study needs comment. Since the major deficit of disadvantaged children is in the area of language development, the instructional program placed heavy emphasis on

remedial and developmental language activities. A language model derived from Osgood's theoretical model (1957) and modified by Kirk and McCarthy (1961) was used to guide the teachers in devising such activities. In short, this model concerns itself with the analysis of psycholinguistic abilities from three dimensions: levels of organization, psycholinguistic processes and channels of communication. Levels of organization depict the functional complexity of the organism. The automatic-sequential level describes a level of organization mediating automatic linguistic habit-chains. The representational level relates to activities concerning the meaning of linguistic symbols. Psycholinguistic processes are subdivided into decoding, encoding, and association. The channels of communication describe the sensory-motor path by which linguistic symbols are received and produced. Avenues of reception chiefly involve visual and auditory channels while motor and vocal channels are the major avenues of response.

With these theoretical proclivities, then, the experimental children were enrolled in a highly structured program designed to train them in the basic operations of information processing and to train them in such a way that they will find information processing a rewarding and interesting experience of itself. Such a program will hopefully compensate for and ameliorate their deficits and will accelerate their rate of growth in areas that will enable them to cope successfully with the school tasks of first grade.

Hypotheses

This study is based upon the general hypothesis that four-year-old culturally disadvantaged children participating in a highly structured preschool program designed to ameliorate deficits and accelerate their rate of growth in areas important for later school success will show progress significantly superior to that of comparable children participating in a traditional nur-

sery school program. The specific hypotheses state that children enrolled in the experimental program will show progress significantly superior to that of children in the comparison group in the following areas:

1. Intellectual functioning as measured by the 1960 Stanford-Binet Individual Intelligence Test, Form L-M.
2. Psycholinguistic abilities as measured by the Illinois Test of Psycholinguistic Abilities.
3. Vocabulary comprehension as measured by the Peabody Picture Vocabulary Test.
4. Perceptual development as measured by the Frostig Developmental Test of Visual Perception.
5. School readiness as measured by the Metropolitan Readiness Tests.

Chapter IV

The Highly Structured Program

Instructional Program

The major difference between the programs for the experimental and comparison groups is that the first is highly structured and the latter is patterned after the traditional nursery school program. Highly structured refers to an approach whereby all activities are carefully programmed to ameliorate specific deficits of the disadvantaged child in learning as well as in basic motivation. The curriculum is designed to develop the basic language processes as well as knowledge in the areas of mathematics, language arts, social studies and science. The development of language skills is given high priority in the curriculum since this is the area of greatest weakness among the culturally disadvantaged. The highly structured program is designed to accelerate the growth of these children in areas that will enable them to cope successfully with the school tasks of first grade.

The model of the language processes which served as a guide in the construction of the Illinois Test of Psycholinguistic Abilities helps teachers devise appropriate remedial and developmental language activities. In addition to such activities, which foster the acquisition of formal language patterns, the teacher's language serves as a standard. The five major processes that make up this model are essentially: (1) understanding (decoding); (2) determining relationships (association); (3) closure (integration); (4) expressing ideas (encoding); and (5) memory. Language is acquired through the auditory and visual channels and, in turn, is expressed either through the vocal or motor channels.

The diagnostic profile provided by the ITPA helps the teacher become

aware or the language processes which can be developed through a given task. It helps her think through the type of response to be elicited from the pupil. It enables the teacher to utilize the stronger language processes to strengthen the weaker areas. In addition, this profile encourages the teacher to re-evaluate from time to time the child's strengths and weaknesses in the language processes and to modify activities accordingly.

Although the children were instructed in groups of five and completed the same general tasks, differentiation of instruction within the small group was the practice. The task, for example, might be classified as visual closure. The particular closure task presented to the group might involve fitting parts of animals together to make integrated wholes. A child who has difficulty in associating ideas might be asked, after the parts are put together, to find two animals that live on a farm (Visual Association). Another might be asked to find the duck and show the group how a duck walks (Motor Encoding). A child who has difficulty in the area of visual memory might be asked to look at five of the animal cards and to close his eyes while the teacher removes two of the cards. He is then asked to name the missing cards. It can be seen that the teacher must be thoroughly acquainted with a given child's profile of strengths and weaknesses to carry out this type of differential treatment in a group situation.

The latitude of the three content areas permits emphasis to be given to such processes as inductive, deductive, and divergent thinking. Presenting tasks that utilize the basic processes of language in varied contexts was felt to promote more effective and refined use of the processes and to facilitate the learning of content materials essential for developing a broad cognitive base upon which future learnings could be built. The curriculum guides developed for this program in mathematics, language, social studies,

science, and music map out the experiences that are presented to these children. A manual developed for this project indicates how content tasks can be used to develop appropriate communication processes.

Organization of the Classes

The two experimental classes, one meeting in the morning and one in the afternoon for approximately two hours and fifteen minutes each, were subdivided into three ability groups with one teacher for each group. The fifteen children in each class thus provided a small group teacher-pupil ratio of 1:5. These groups remained intact for the entire seven months except in a few cases where progress warranted moving a child to a higher group or where two acting-out children were reinforcing each other's behavior and assignment to different groups proved necessary.

Three relatively small rooms were used so that the children in one group were not distracted by the activities of children in another group. Because of the importance of the teacher-child relationship in securing adequate motivation, the children did not change groups for specific curriculum areas but remained with the same teacher for all content areas, for juice, and for field trips. Only at story time, music time, and during a brief period (less than fifteen minutes a day) of directed play were the children free to form their own peer groupings. The two hours and fifteen minutes of the school day were divided into three blocks of approximately twenty-five minutes each for mathematics, language arts, and social studies or science. Three fifteen-minute periods were devoted to music, story period, and directed free play.

Records and Reports of Teachers

Each teacher kept a daily lesson log of the learning activities presented to the children in her group and of their responses to these activ-

ities. She also kept anecdotal records on the academic progress and the behavior patterns of each child in her group. It was felt that keeping such records would enable the teacher to maintain a current perspective of each child and his specific strengths and weaknesses.

Instructional Materials

To facilitate planning, each teacher was given a copy of the test results and psychological report for each child in her group. Many of the instructional materials used were teacher-made to fit the needs of the individuals in her group. Subject matter was presented most frequently in a game format: card decks, lotto games, models and miniatures, sorting, matching, and classifying games. Initial and early presentations relied heavily on manipulative and multisensory materials; however, a deliberate attempt was made to achieve as many verbal responses as possible. As the children progressed, more use was made of books (often in sets of five for the small groups) and of mimeographed materials in a large, uncluttered format, which, with the exception of the Frostig Program for the Development of Visual Perception, were teacher-made. Crayons, dri-marks, and primary pencils were used with these materials. Instructional materials were designed to reinforce, expand, and facilitate transfer of concepts and information in specific content areas and to further diagnose deficits in information and communication processes.

Motivation

The class organization, the reduced teacher-pupil ratio, and the highly structured activities provided maximum opportunities for fostering motivation to learn. Differentiation of instruction insured success. Reduced teacher-pupil ratio allowed for immediate feedback and reinforcement as well as more meaningful interaction between teacher and pupils.

Chapter V

Method

Selection of Subjects

The subjects for this program were drawn from the preschool population of culturally disadvantaged children within the communities of Champaign and Urbana, Illinois. Relevant social agencies--the Public Health Department, welfare agencies, the public housing authorities, and the public schools--were contacted to gather initial referrals. In addition, a house-to-house survey was conducted in the low socioeconomic areas of Champaign-Urbana. The basic criteria for selection of the subjects were: (1) that the subject be from a low socioeconomic home according to the father's occupation based on Warner's Revised Scale for Rating Occupations (1949) and housing ratings obtained through the City Planning Commissioner's Office; (2) that the subject be four years old by December 1, in keeping with public schools' entrance policies; (3) that the subject not have had previous preschool experience. Children with gross physical handicaps and mentally retarded children were excluded. In addition to the information gathered from agencies, clinical evaluations by psychologists and social data obtained in the survey were used in determining eligibility.

Of the 75 candidates referred for final screening, 60 were selected for placement in the program. The selection of children for the classes (two experimental and two comparison classes of 15 children each) was made in several steps. First, they were stratified by level of intelligence into three groups. Second, within each of the intelligence strata, the children were randomly assigned to the four classes. Third, adjustments were made in the racial and sexual composition of the classes. For reasons such as shifts in family residence, five subjects had to withdraw from the program; consequently,

the final statistical evaluation was based on a population of 55 subjects (27 experimental and 28 comparison).

Characteristics of Subjects

The subjects were described in terms of age, race, sex, socioeconomic status, and intelligence. This information in summarized in Table I.

The chronological ages of the subjects ranged from three years and ten months to four years and nine months for both groups. The mean chronological ages for the respective groups were 4.34 for the experimental group and 4.33 for the comparison group. The experimental group consisted of nine (33%) Caucasian children and 18 (67%) Negro children. The comparison group was composed of 11 (40%) Caucasian children and 17 (60%) Negro children. The higher proportion of Negro children in each group reflects the disproportionate number of Negroes within the socioeconomic level from which the sample was drawn. For the purposes of this study, a similar racial proportion was maintained between the experimental and comparison groups. The distribution of males and females in both groups was essentially the same--13 (48%) males and 14 (52%) females in the experimental group and 15 (54%) males and 13 (46%) females in the comparison group.

The 1960 Stanford-Binet Intelligence Scale was used as the intelligence measure for the total sample. A mean Binet IQ of 95.96 was attained by the experimental group while the comparison group earned a mean quotient of 95.50. A comparison of performances on this instrument revealed no differences between the groups on their respective levels of intellectual functioning. The mean IQ for both groups fell in the average range of intellectual ability when compared with norms derived from the general population.

Socioeconomic status was determined by rating the father's occupation and the dwelling type according to the Warner Scale (1949). Weighted scores were obtained by determining the classification of the dwelling and the

father's occupation and multiplying by three and four respectively. The weighted mean scores of 43.07 for the experimental children and 42.50 for the comparison group revealed no differences between the groups.

Table I

Characteristics of Subjects

	Mean CA	Mean Mental Age	Mean Binet I.Q.	Race		Sex		Mean Weighted S.E.S.
				White	Negro	M	F	
Experimental N=27	4.34	4.19	95.96	9	18	13	14	43.07
Comparison N=28	4.33	4.16	95.50	11	17	15	13	42.50
t Value	t=.09	t=.21	t=.16					

The mean number of siblings for each group was found to be essentially the same--a mean of 3.59 siblings in the experimental group and 3.78 in the comparison group. Of the 27 experimental subjects, 14 fathers were living in the home. Of the 28 comparison subjects, 12 fathers were living in the home.

In the experimental group, the mean number of years of school completed by the fathers was 9.60 and by the mothers, 9.92. The fathers in the comparison group achieved a mean educational level of 9.83 years and the mothers' mean educational level was 9.67 years. No significant differences were found between the educational levels of the parents for the respective groups. These data are presented in Table II.

Table II

Parent Education (Highest Grade Completed)

Grade level	4	5	6	7	8	9	10	11	12	Information Not Available	Total
Experimental	3 (1)[a]	3 (1)	3 (1)		19 (5)	8 (2)	8 (2)	15 (4)	30 (8)	11 (3)	N=27 X=9.60
Father											t= .34
Comparison		3 (1)			18 (5)	10 (3)	23 (5)	10 (3)	18 (5)	18 (5)	N=28 X=9.83
Experimental				15 (4)	15 (4)	15 (4)	8 (2)	19 (5)	25 (7)	3 (1)	N=27 X=9.92
Mother											t= .43
Comparison				3 (1)	23 (6)	18 (5)	10 (3)	10 (3)	33 (9)	3 (1)	N=28 X=9.67

a. The first number in each group is the percent and the second number is equal to the number in that group.

Table III presents data on source of family income. It should be noted that 57% of the families of comparison subjects relied on public aid while only 37% of the families of experimental subjects were dependent on public assistance for their source of income. Data on public assistance were obtained from the agency. Any conclusions based on data other than public assistance should take into account the fact that this information was gathered through interviews with the mothers and the accuracy of their reports could not always be verified. Despite differences in sources of income between the two groups, all were culturally disadvantaged according to the criteria used in this study.

Data on the fathers' occupations are presented in Tables IV and V. Of the 23 fathers included in the experimental sample (see footnote, Table IV, regarding fathers not included) 18% were employed as truck drivers, 18% as factory workers, and 18% as skilled laborers. In the comparison group, the areas of employment most frequently reported were construction and general labor (37%), truck drivers (16%), and skilled labor (16%). These occupations predominantly fall at the lower end of the Warner scale with 20 (87%) of the experimental fathers and 16 (84%) of the comparison fathers receiving ratings of 6 and 7. Families in which the father's occupation was determined to be above 5 were not considered eligible for placement in the program.

Nineteen (70%) of the mothers of the experimental children were housewives. The second most frequently reported occupation was domestic work and food service. The occupations of the mothers of the comparison children were comparable: 22 (78%) were housewives and three (10%) were employed in food services. See Table VI.

Measurement Instruments

The 1960 Stanford-Binet Intelligence Scale, Form L-M, was used to assess the intellectual functioning of the subjects and to identify cognitive

Table III

Source of Income

	Father (1)	Mother (2)	Father & Mother (4)	Public Aid (3)	Total
Experimental N=27	34 (9)[a]	7 (2)	22 (6)	37 (10)	N=27 100%
Comparison N=28	29 (8)	7 (2)	7 (2)	57 (16)	N=28 100%

a. The first number in each set is the per cent, the number in parentheses is equal to the number of subjects in that classification.

Table IV

Father's Occupations

	Construction and General Labor	Food Service	Truck Driver	Factory Work	Skilled Labor	Armed Forces	Janitor	Stock Boy	Warehouse Foreman	Street Cleaner	Disabled	Unemployed	Salesman	Total %
Experimental Group	13(3)[c]	13(3)	18(4)	18(4)	18(4)	4(1)	4(1)	4(1)	4(1)		4(1)			(N=23)[a] 100
Comparison Group	37(7)	5(1)	16(3)	5(1)	16(3)		5(1)			5(1)		5(1)	5(1)	(N=19)[b] 99

a. Of the Experimental Group one father was reported as being in prison and three of the informants could give no occupational information of the fathers.

b. Ten of the informants could give no occupational information on the fathers.

c. The first number in each set is the percent and the second number is equal to the number in that group.

Table V

Occupational Ratings

For Fathers [a.]

Rating Assigned Occupation	Experimental	Comparison
5	13 (3)[b]	16 (3)
6	48 (11)	42 (8)
7	39 (9)	42 (8)
Total	100 (N=23)	100 (N=19)

a. Ratings are based on the Warner Revised Scale for Rating Occupations (Warner 1949).

b. The first number in each set is the percent and the number in parentheses is equal to the number in that group.

Table VI

Mother's Occupations

	Factory Work	Domestic	Food Service	Nurse or Nurses Aide	Recep-tionist	Checker (Super Market)	House-wife	Total
Experimental Group	4 (1)	7 (2)	7 (2)	4 (1)	4 (1)	4 (1)	70 (19)	100 N=27
Comparison Group	4 (1)	4 (1)	10 (3)	4 (1)			78 (22)	100 N=28

a. The first number in each set is the percent and the second number is equal to the number in that group.

strengths and weaknesses in both groups.

The psycholinguistic abilities of the subjects were measured by the experimental edition of the Illinois Test of Psycholinguistic Abilities (McCarthy and Kirk, 1961). This instrument provided a basis for comparing the total psycholinguistic attainments of both groups of children. The nine subtests of the ITPA also provided a means for contrasting relative strengths or weaknesses between and within the respective groups.

The Peabody Picture Vocabulary Test was administered to determine the level of vocabulary development of the subjects. Form A was used for the pretest evaluation and Form B for the posttest evaluation. The subjects were described in terms of the Peabody mental age and IQ.

In an effort to determine the level of perceptual development of the subjects, the Frostig Developmental Test of Visual Perception was administered. Although this instrument is divided into five subtests, the data were analyzed on the basis of the scores for all areas and the derived Perceptual Quotients.

The Metropolitan Readiness Tests, Form R, were administered at the completion of the program to ascertain the subjects' level of readiness for the acquisition of basic academic skills: reading readiness, number readiness, and total readiness.

An evaluation of the subjects' general level of adequacy of articulation was determined by the administration of the Templin-Darley Tests of Articulation. The results of the Templin-Darley were used as an aid in curriculum building and were not subjected to statistical analysis.

With the exception of the Metropolitan Readiness Tests, the above instruments were administered to the subjects on a pre- and posttest basis. All of the tests were administered by school psychologists except the Templin-Darley Tests of Articulation which were administered by speech correctionists. Standardized instructions in test manuals were followed to insure uniformity in

administering and scoring the instruments. A general constancy was maintained in the testing environment for all children, and the examiners were given no information concerning a given subject's group placement.

Information regarding the social histories of the subjects and their families was obtained by the teachers through structured interviews with the parents. The examining psychologist, teachers, and the director of the project held case conferences on each experimental child where pertinent data were discussed. A psychological report was written on each experimental subject by the examining psychologist for the use of the teachers and the director as a guide in developing the curriculum. Logs and anecdotal records were also kept by the teachers of both groups. Detailed reports on the individual progress of the subjects and summaries of parent conferences were also submitted by the classroom teachers.

Treatment Period

The subjects participated in the program for seven months; however, the time lapse between pre- and posttesting was eight months. This time lapse resulted in a mean pretest chronological age of four years and four months and a mean posttest chronological age of five years and zero months for both groups. Both the experimental and comparison groups were divided into morning and afternoon classes which met five days a week for approximately two hours and fifteen minutes each day.

Method of Analysis of Data

The analysis of the data obtained from this study is presented in two ways: (1) statistical analysis of the data and (2) incorporation of the data in a case study approach. The parametric procedure employed was the *t* test; two-tailed tests of significance were used to evaluate the pretest data, and the one-tailed test was used to evaluate the posttest performances

and the net gains achieved by the subjects. Relevant characteristics of culturally disadvantaged children are described in two representative case studies.

Chapter VI

Results and Discussion

The results of the statistical tests of data relating to each of the hypotheses are organized under five headings: Intellectual Functioning, Vocabulary Development, Psycholinguistic Abilities, Visual Perception, and School Readiness. Only those differences in scores which would occur by chance once in twenty times ($p < .05$) were accepted as statistically significant. Evidences of a trend ($p < .10$) in the data are noted.

Hypothesis I: Intellectual Functioning

It was hypothesized that the experimental subjects would show progress in measured intelligence significantly superior to that of the comparison subjects. The results of the study clearly confirm this hypothesis. The data on the Binet IQ and MA for each group on the pretest, posttest, and gain scores, together with t's and level of significance, are presented in Table I in the appendix. Figure I on page 37 presents bar graphs illustrating the Binet IQ gains.

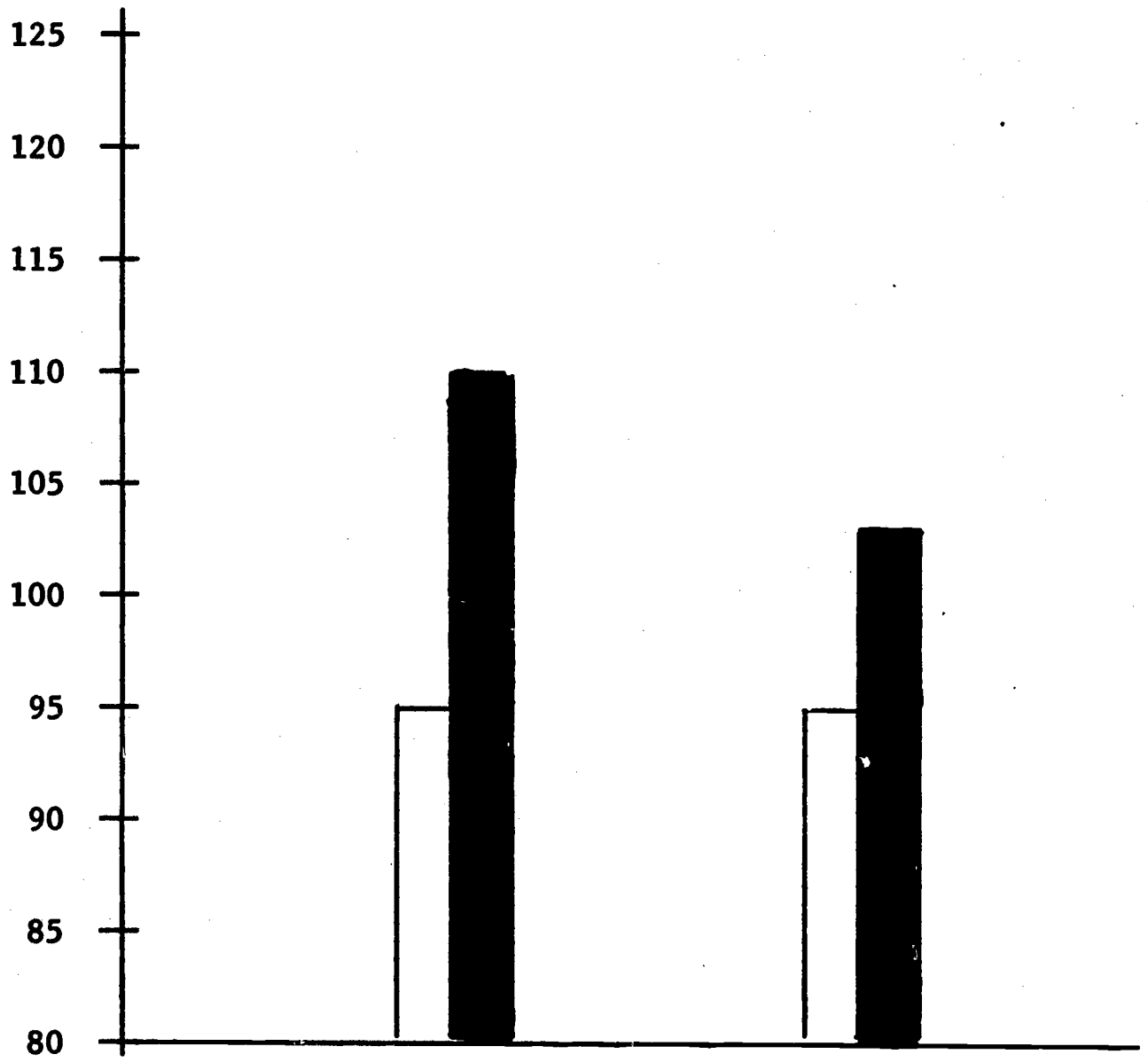
At the beginning of the study, both groups were matched on intellectual ability. The initial mean intelligence quotients were 95.96 for the experimental group and 95.50 for the comparison group. Clearly, a difference in IQ of .46 between the two groups was not statistically significant.

The mean IQ of the comparison group increased from 95.50 at the start of the study to 103.54 at the time of posttesting, a gain of 8.04 points. The experimental group gained 14.30 points; their mean intelligence quotient increased from 95.96 to 110.26. In contrasting the gains of the two groups, the difference reached the .001 level of confidence in favor of the experimental group. During the eight months between pre- and posttesting, both

Figure I

Binet IQ Gains for

The Experimental and Comparison Groups



Experimental		Comparison	
Pretest IQ	95.96	Pretest IQ	95.50
Posttest IQ	110.26	Posttest IQ	103.54
Gain	14.30	Gain	8.04

groups manifested greater increases in intellectual functioning than would be expected on the basis of increased chronological age. The experimental group evidenced a gain in mental age of approximately 15 months while the comparison group gained approximately 12 months.

Inspection of the data revealed that within the experimental group, six children (22%) of the 27 made IQ gains of 20 or above. A total of 12 children (44%) evidenced an IQ gain of 16 points or more, which is one standard deviation on the Binet scale. Seventy-four percent of the children (20) in the experimental program showed IQ gains of 10 points or more. No child in the experimental group failed to make a gain. Similar inspection of the data for the 28 children in the comparison group presents a rather different picture. Here, only one child (4%) gained 20 or more IQ points as contrasted with the six who evidenced such gains in the experimental program. While 44% (12) of the children in the highly structured program evidenced at least a 16-point gain, only 29% (8) of the comparison group manifested a change of that magnitude. Thirty-nine percent (11) of the comparison group showed gains of 10 points or more as compared with seventy-four percent (20) of the experimental group. In the experimental group no child failed to show a gain in IQ points from pre- to posttesting, while seven children in the comparison group showed a loss. Since the two groups were comparable in socioeconomic status and initial measured intellectual functioning, this analysis provides a favorable vote of confidence for the superiority of the experimental program.

Educators seem convinced that preschool experiences can be used as an antidote for cultural deprivation, but the important question is: "Which of many educational approaches promotes the greatest growth in culturally disadvantaged children?" This question can be answered only by carefully

controlled research which experimentally compares varying educational programs. This study shows that the highly structured program results in greater gains in intellectual ability than does a traditional nursery school program. Such results are highly encouraging and begin to provide the educator with answers to the question of "How should we teach?" These children have made extremely promising intellectual gains during a seven-month program, but the crucial test will be whether they maintain these gains through subsequent schooling. For this information, one must await later comparisons.

Hypothesis II: Psycholinguistic Abilities

The second major hypothesis of this study was that, in contrast to comparison subjects, the experimental subjects would evidence significantly superior progress in psycholinguistic functioning as measured by the ITPA. Both groups made remarkable progress. Since the overall progress of both groups was essentially the same, this hypothesis was not confirmed. Statistical analyses were performed on both language age and raw scores for the nine subtests and for the total score, but the findings, however, were essentially the same. Deviations are noted and discussed later. The data relating to each subtest are presented in terms of the more general psycholinguistic processes to which they pertain: decoding, encoding, association, automatic processes, and short-term memory sequential processes.

Figures II and III on pages 41 and 42 present subtest and total ITPA profiles of the pre- and posttest language ages of the experimental and comparison groups. Figure IV on page 44 shows the mean gains in months of both groups for the subtests and for the total ITPA. Figure V on page 54 presents a comparative profile of mean posttest language ages of the two groups. In addition, the means, variances, and levels of significance for language age and raw scores on pretest, posttest and gain scores for all subtests and for the total can be found in the appendix.

Decoding

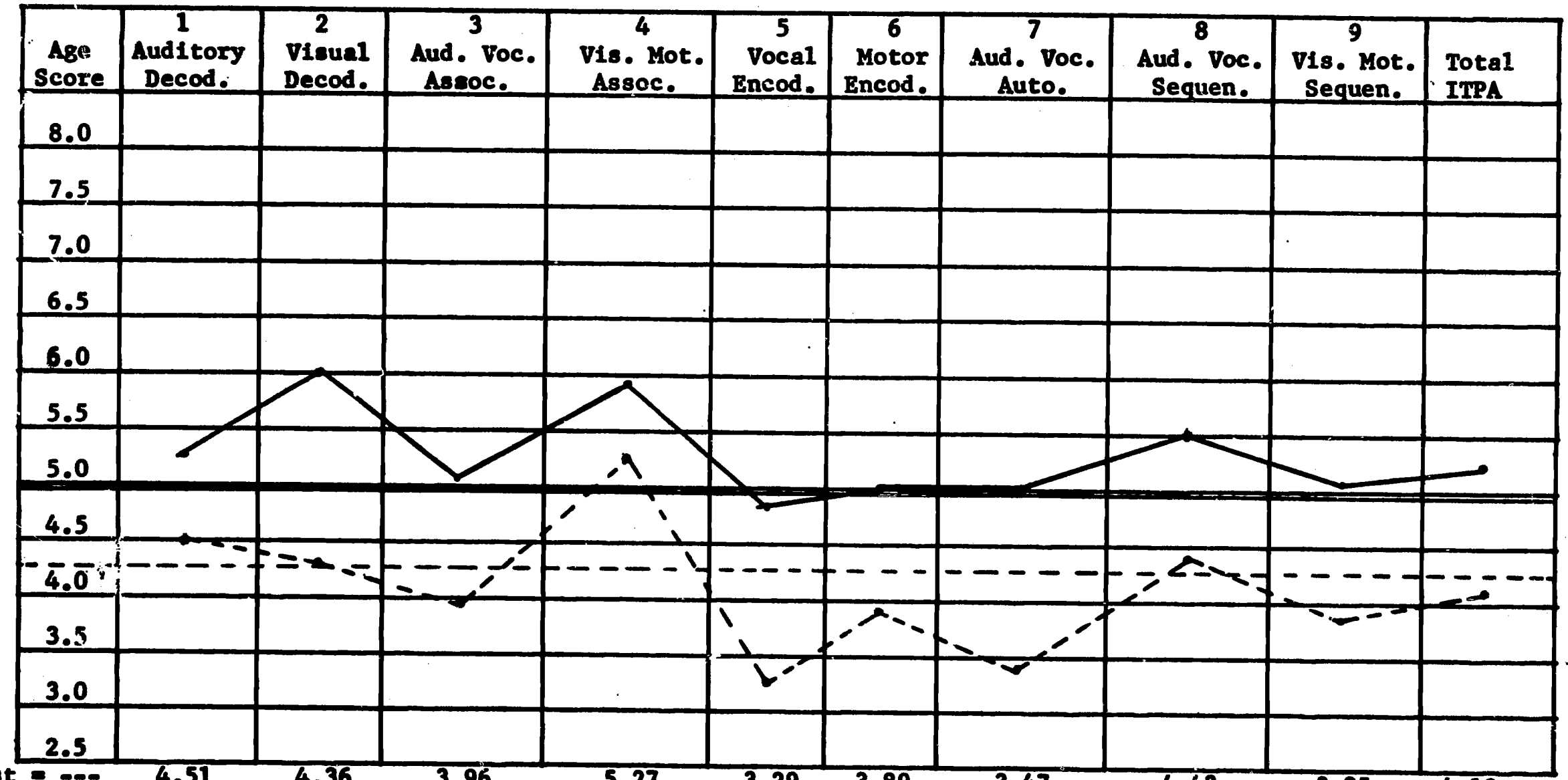
The ITPA has two decoding tests, an Auditory Decoding test and a Visual Decoding test.

Auditory Decoding

At the time of pretesting, there was a trend indicating that the experimental group was superior to the comparison group on the Auditory Decoding subtest. The mean for the experimental group was 4.51 years, while the mean

Figure II

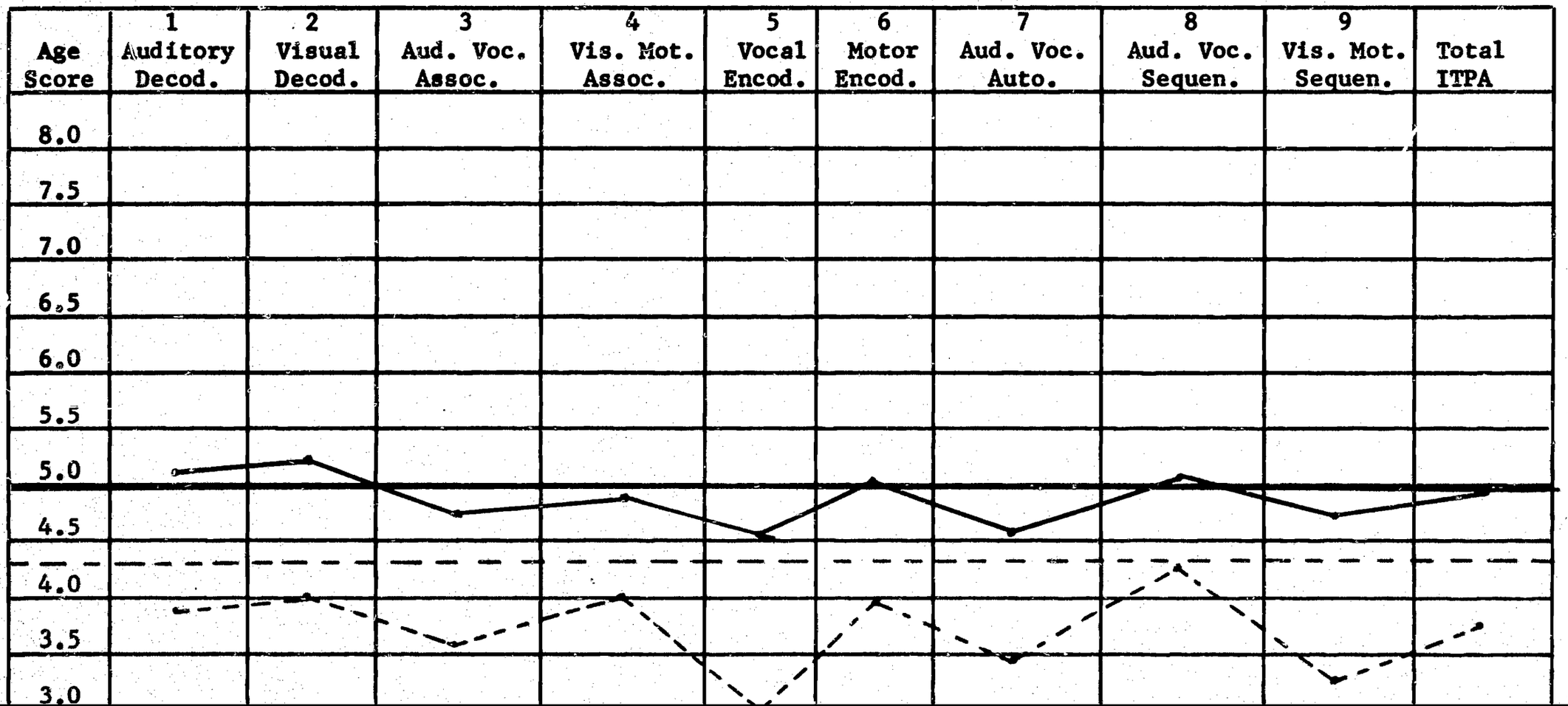
Language Age Profile on ITPA Pre- and Posttest Performances of Experimental Group



Exp. Pretest = --- CA = 4.34	4.51	4.36	3.96	5.27	3.29	3.89	3.47	4.43	3.85	4.12
Exp. Posttest = — CA = 4.98	5.24	6.02	5.13	5.91	4.83	5.03	5.03	5.53	5.13	5.27

Figure III

Language Age Profile on ITPA Pre- and Posttest Performances of Comparison Group



for the comparison group was 3.81 years. It should be noted that on the initial findings the experimental group's level of achievement on this subtest was above the expectancy of their chronological age, 4.34.

The posttest findings revealed no differences between the two groups; the experimental subjects obtained a language age of 5.24, a gain of .73 years, and the comparison subjects' language age rose to 5.19, a gain of 1.38 years. While the comparison group negated the initial difference with a gain which was greater than that of the experimental subjects, a comparison of gain scores indicated only a trend in favor of the comparison group. In the analysis of raw scores, the trend did not hold. The greater variability of the performance of the comparison group accounts for lack of statistical significance. Apparently the traditional nursery school program enhances the listening skills of culturally disadvantaged children to a level at least comparable to that of a highly structured program. Both groups were now achieving above their posttest chronological age of 4.98.

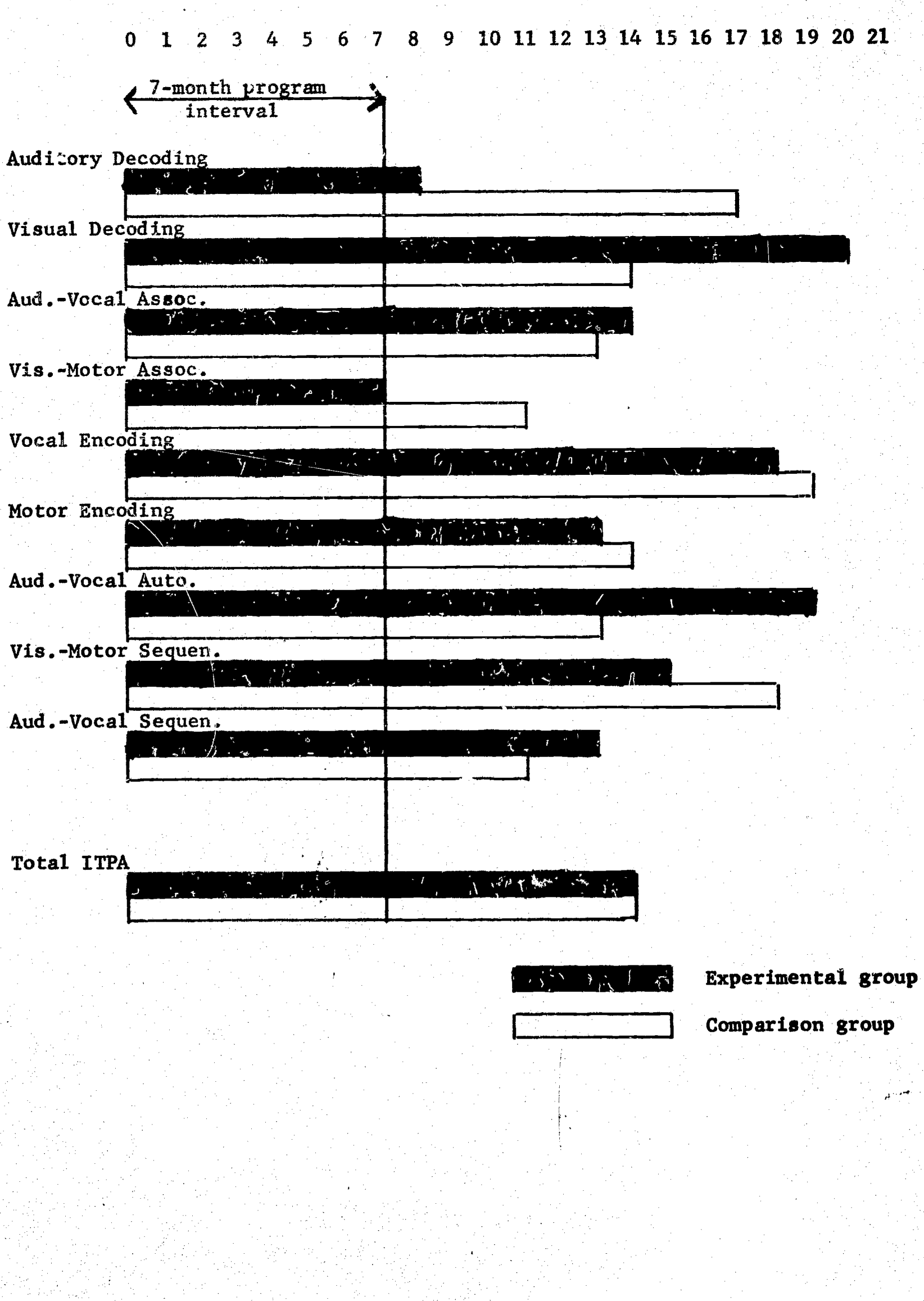
Visual Decoding

The two groups did not differ significantly at the beginning of the study on the Visual Decoding subtest; the experimental subjects had a mean language age of 4.36, while that of the comparison subjects was 4.01. The experimental group scored at their chronological age, while the comparison group scored approximately three months below CA expectancy.

The posttest findings revealed a significant difference between the two groups; the experimental subjects obtained a language age of 6.02, a gain of 1.66 years, while the comparison subjects obtained a language age of 5.25, a gain of 1.24 years. The difference between the gains, however, was not statistically significant. It should be noted that both groups were functioning above their posttest CA. Differences in the performances of the two

Figure IV

Mean Gains in Months on ITPA Subtests and Total



groups on this subtest indicate that the experimental subjects became better able to comprehend and to process visual stimuli than did the children in the comparison group. At the time of posttesting, the experimental group had enhanced their relative position of superiority over the comparison group.

In summary, the results of this study in the area of decoding show that there was a trend in favor of the comparison group in their ability to process and understand auditory inputs (i.e., Auditory Decoding), when language age scores were analyzed. This trend did not hold up, however, when raw scores were analyzed. The experimental subjects were significantly superior in learning how to interpret visual stimuli (i.e., Visual Decoding).

Association

The two association subtests of the ITPA are the Auditory-Vocal Association test and the Visual-Motor Association test.

Auditory-Vocal Association

The experimental group earned an initial language age score of 3.96 years, while the comparison group obtained a score of 3.68 which established the comparability of the two groups. Both groups scored below their chronological age.

In terms of posttest performances, the experimental group earned a language age of 5.13 years which yielded a net gain of 1.17 years. The comparison group posttest mean of 4.72 years revealed a net gain of 1.05 years. In contrasting posttest performances of both groups, a trend is evidenced in favor of the experimental group. A comparison of the respective gains revealed no significant differences. The posttest scores of the experimental group were slightly above their chronological age expectancy while the comparison group were functioning below their CA.

An evaluation of the test data on the Auditory-Vocal Association test

revealed that the experimental group gained approximately 14 months during the seven-month program interval. The comparison group gained approximately thirteen months during this period. Their level of achievement was now four months below chronological age expectancy and five months below the achievement level of the experimental subjects, who scored slightly above CA expectancy at posttesting. These findings give some support to the premise that a highly structured preschool program is more conducive to the acceleration and maintenance of Auditory-Vocal Associational skills.

Visual-Motor Association

The initial language age of the experimental group was 5.27 years, while that of the comparison group was 4.00 years. This initial difference of 1.27 years was statistically significant. The experimental subjects scored substantially above CA expectancy, while the comparison group scored somewhat below CA expectancy.

The experimental group achieved a posttest mean language age of 5.91 years, which yielded a net gain of .64 years, which was consistent with the seven-month program interval. The comparison group earned a mean of 4.85 years, a mean gain of .85 years, which exceeded the program interval by four months. There were, however, no statistical differences between the two gain scores. On posttest scores the same initial level of significance was maintained. The relative standing of the two groups in regard to posttest scores and CA expectancy remained essentially the same.

In summary, the gains of the experimental group were sufficient to maintain their statistically significant superiority over the comparison group, but there was no evidence that the highly structured program was more conducive to the development of Visual-Motor Associational skills than was the traditional program.

Encoding

Encoding is the ability to express one's ideas. The ITPA measures two kinds of encoding. The Vocal Encoding test assesses the child's ability to express his ideas in spoken language. His ability to express ideas in gestures is measured by the Motor Encoding test.

Vocal Encoding

There was no significant difference in the mean language ages of the two groups initially; the experimental group had a mean language age of 3.29 while the comparison group had a mean language age of 2.99. Both groups scored more than a year below their chronological age.

The posttest language age scores did not differ significantly. The experimental subjects had an average language age of 4.83, a gain of 1.54 years, while the comparison subjects had an average language age of 4.59, a gain of 1.60 years. The gains made by each group did not differ significantly from each other; however, both groups had reduced considerably the extent of their initial deficiency.

The literature describing culturally disadvantaged children stresses their deficiencies in verbal expression. At the beginning of the study, both groups were approximately one year retarded on the Vocal Encoding subtest. At the end of the program interval, both groups evidenced considerable gains in this ability; the experimental children gained an average of 18 months, and the subjects in the comparison group gained an average of 19 months. Both groups now had scores in Vocal Encoding which were still below their chronological ages but less markedly so. If we assume that children should gain approximately one month on the subtest for each month's increase in chronological age, each group should have gained about seven months during the program interval. Clearly, both groups outstripped this expectation.

Accelerated growth in vocal encoding ability can probably be expected when culturally disadvantaged children enter any type of school program. Generally, all school programs encourage verbal expression. In addition, the teacher serves as a model for grammatically correct verbal expression. At home, the language models provided by the lower-class adults are frequently highly limited, and the young child is often discouraged in his attempts to ask questions. His efforts to describe his environment gain little attention from adults preoccupied with the hardships of poverty, and he becomes stunted in his willingness and ability to use verbal expression. When the culturally disadvantaged child enters school, the ground rules change. Here the teacher encourages verbal expression, listens to what the child says, commends him for his ideas, and provides him with words to help say what he seems to want to say. When conditions for reinforcement of verbal expression change so drastically, it seems reasonable to expect a rather dramatic change in the child's performance in Vocal Encoding. This is what the data suggest, since both the experimental and comparison children showed considerable progress in their ability to verbally express ideas.

Motor Encoding

There were no significant differences between the means of the two groups on the pretest; the experimental group earned a mean language age of 3.89, and the comparison group achieved a mean language age of 3.96. Both groups were slightly below their CA expectancy. The posttest evaluation revealed that the experimental mean rose to 5.03, a gain of 1.14 years, while the comparison group obtained a mean of 5.14, a gain of 1.18 years. The difference between the posttest scores was not significant. The net gains of the two groups also did not differ statistically. Both groups now scored slightly above CA expectancy. In the area of Motor Encoding, then, both

groups evidenced gains of approximately one year. Apparently both programs enhanced this skill.

All in all, the data indicate that both groups of children increased their encoding skills and that the increase was more substantial in the case of Vocal Encoding than in the case of Motor Encoding. The experimental subjects did not show a significantly greater increase in these skills than did children in the comparison group.

Automatic Process

At the beginning of the study, the mean language age of the experimental group on the Auditory-Vocal Automatic subtest was 3.47, which was essentially the same as the mean of 3.48 of the comparison group. Both groups were approximately ten months below chronological age expectancy.

During the course of their preschool experience, both groups made substantial gains. The experimental subjects achieved a language age of 5.03, a gain of 1.56 years; the comparison subjects achieved a language age of 4.60, a gain of 1.12 years. No significant difference was found between the mean posttest performances of the two groups. The difference between the gains of the two groups indicated a trend in favor of the experimental group; this difference reached significance when raw scores were analyzed. On posttest scores the experimental group were now functioning at their CA expectancy, while the comparison group were functioning approximately five months below expectancy.

The Auditory-Vocal Automatic subtest is concerned with the syntactical and grammatical aspects of language. A child becomes familiar with the linguistic structure of what he says from what he has already heard. Children acquire the ability to use language in its grammatical aspects long before they can verbalize what grammatical rules they are, in fact, following. This type

of learning is called automatic because the habit chains acquired in relation to grammar permit the individual to attend to the content of a message while the words used to express the message seem to occur automatically.

In the experimental curriculum, teachers structured many of the activities in the content areas of math, language, social studies and science to require responses which would emphasize the grammatical and syntactical structure of language. The stress which the experimental program placed upon such use of language resulted in the experimental group's making greater progress in using these skills as measured by the Auditory-Vocal Automatic subtest. During the seven-month program, the experimental subjects gained approximately 19 months in language age on this subtest, while the children in the comparison group gained approximately 13 months. Initially, both groups obtained scores below their average chronological age of four years and four months. After school experiences, the children in the experimental group evidenced skills in this area commensurate with their chronological age; the comparison subjects still evidenced a retardation in this area of about five months. Evidently, then, the experimental program was superior to the traditional program in developing Auditory-Vocal Automatic skills.

Sequencing

The sequencing section of the ITPA consists of two subtests, the Visual-Motor Sequencing test and the Auditory-Vocal Sequencing test.

Visual-Motor Sequencing

The experimental group's pretest mean language age was 3.85 years, while the comparison group's mean language age was 3.26. There was a trend in favor of the experimental group at the outset of the program. Both groups were functioning below CA expectancy. The comparison group was functioning approximately one year below.

The experimental subjects earned a mean posttest language age of 5.13,

a net gain of 1.28; while the comparison subjects' posttest language age of 4.79 resulted in a 1.52 mean gain. There was a trend in favor of the experimental group on posttest scores. This trend, however, reached statistical significance when raw scores were analyzed. Although the comparison group gained 18 months as compared to the 15-month gain of the experimental group, this difference did not reach statistical significance. On posttest scores the experimental subjects were functioning slightly above CA expectancy, while the comparison group was functioning somewhat below expectancy.

During the course of the treatment program, the deficit was alleviated in the experimental group. Their development in this area was sufficiently accelerated to overcome the initial five-month deficit and to result in a level of achievement which was one month above the CA expectancy. The comparison group evidenced a greater growth during the period between pre- and posttesting; but because of their initial disadvantage they still had a three-month deficit.

Auditory-Vocal Sequencing

Initially, the experimental group earned a mean language age of 4.43 years, and the comparison group achieved a mean language age of 4.30 years. Analysis of the data revealed no significant difference between the two scores. Both groups were functioning essentially at CA expectancy.

The experimental subjects earned a mean posttest language age of 5.53 years, a gain of 1.10 years, while the comparison group achieved a posttest language age of 5.16 years, a gain of .85 years. The gains made by both groups during the interim were substantial. There were no significant differences between the two groups on posttest measures or on mean gains. On posttests the experimental group was functioning at approximately six months above expectancy. The comparison group was functioning two months above CA expectancy.

In summary, it seems apparent that preschool training for culturally disadvantaged children has a positive effect upon their abilities to perform Visual-Motor Sequencing and Auditory-Vocal Sequencing tasks. The progress of both groups outstripped the expectancy of the program interval and was essentially comparable.

Total ITPA Scores

The total language age score is a composite of the subjects' performances on the nine subtests of the ITPA. The score represents an overall assessment of the level of psycholinguistic functioning and cannot be construed as representing a subject's level of proficiency in each of the nine psycholinguistic skills.

The total pretest scores revealed no significant differences between the experimental group's mean language age of 4.12 years and the comparison group's mean language age of 3.72 years. Both groups were functioning below CA expectancy.

The experimental subjects earned a mean posttest language age of 5.27 years, a gain of 1.15, while the comparison group's mean posttest language age of 4.91 resulted in a gain of 1.19. The experimental subjects were significantly superior to the comparison subjects on total posttest language age scores. A comparison of gain scores revealed no significant differences. On posttest scores the experimental subjects were functioning three months above CA expectancy, and the comparison subjects were functioning one month below CA expectancy. An assessment of the relative efficacy of the two programs in the development of psycholinguistic skills reveals a remarkable total language growth on the part of both groups. During the seven-month program interval both groups achieved mean gains of 14 months.

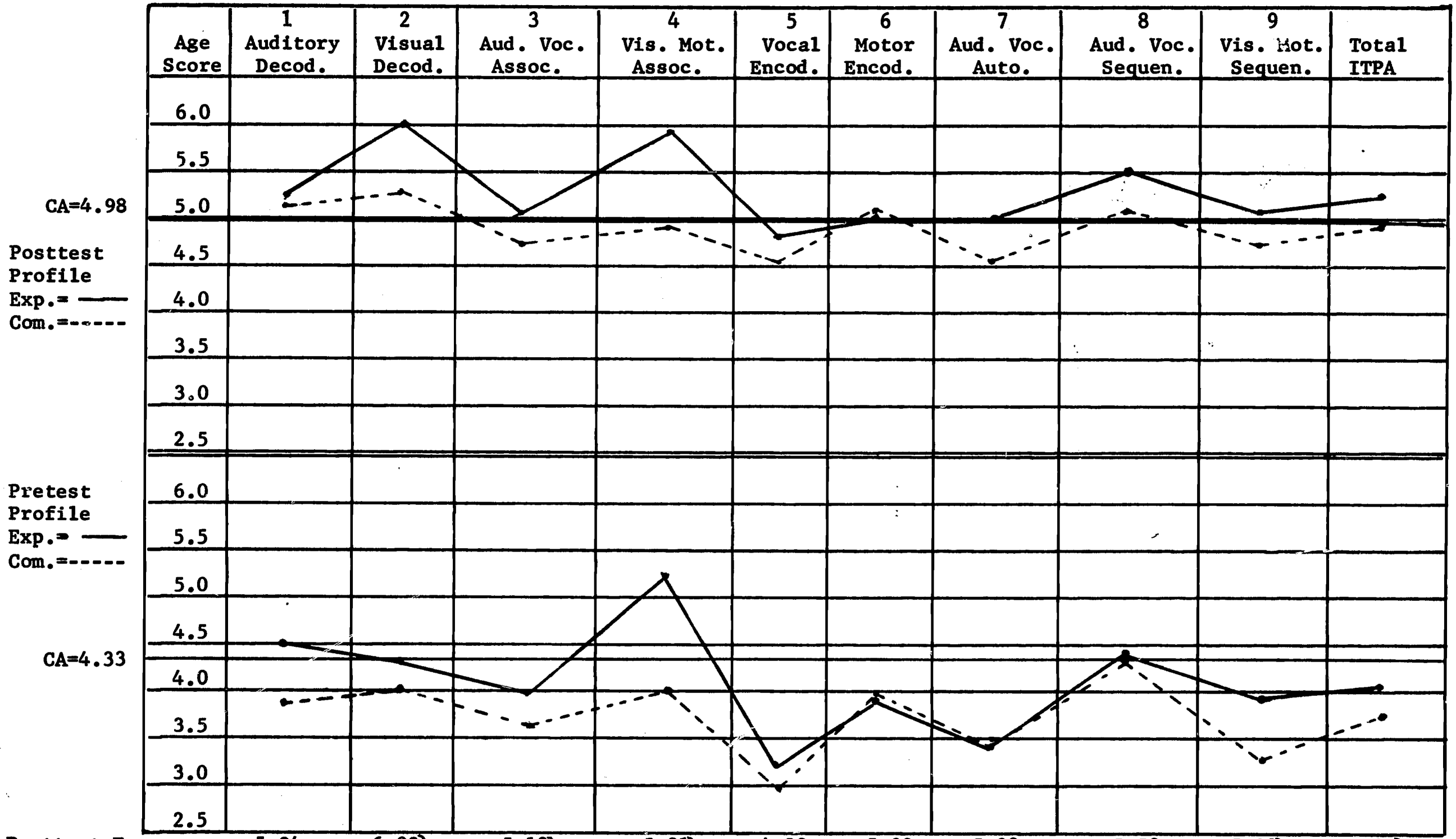
Overview of the ITPA

A summary of the pre- and posttest profiles for both groups is presented

in Figure V on page 54. The hypothesis relative to psycholinguistic abilities stated that the experimental subjects would evidence superior gains in psycholinguistic functioning as measured by the ITPA.

Although there was no instance in which the comparison group was significantly superior to the experimental group and all significant findings were in the direction originally predicted, the hypothesis was not clearly substantiated. Both groups made remarkable but comparable progress. Neither group failed to meet the interval expectancy of seven months on the total score or on any subtest. If the subjects are able to maintain these gains through their subsequent school years and if increased aptitude in psycholinguistic functioning does aid children in learning to order and process the environment (as it should), one cannot help but believe that such preschool programs are of value in helping culturally disadvantaged children realize their intellectual potential.

Figure V Language Age Profiles on ITPA Pre- and Posttest Data for Experimental and Comparison Groups



	1 Auditory Decod.	2 Visual Decod.	3 Aud. Voc. Assoc.	4 Vis. Mot. Assoc.	5 Vocal Encod.	6 Motor Encod.	7 Aud. Voc. Auto.	8 Aud. Voc. Sequen.	9 Vis. Mot. Sequen.	Total ITPA
Posttest Exp.	5.24	6.02 }*	5.13 }+	5.91 }*	4.83	5.03	5.03	5.53	5.13 }+3	5.27 }*
Posttest Com.	5.19$_1$	5.25 }	4.72 }	4.85 }	4.59	5.14	4.60$_2$	5.16	4.79 }	4.91 }
Pretest Exp.	4.51 }+	4.36	3.96	5.27 }*	3.29	3.89	3.47	4.43	3.85 }+	4.12
Pretest Com.	3.81 }	4.01	3.68	4.00 }	2.99	3.96	3.48	4.31	3.26 }	3.72

Figure IV

FOOTNOTES

1. A comparison of gain scores indicated a trend in favor of the comparison group; however, in the analysis of raw scores, this trend did not hold.

2. A comparison of gain scores indicated a trend in favor of the experimental group; in the analysis of raw scores, this trend reached statistical significance.

3. On posttest language age scores, there was a trend in favor of the experimental group which reached statistical significance when raw scores were analyzed.

* Significant difference

\+ Trend at .10 level of confidence

Hypothesis III: Vocabulary Development

It was hypothesized that the experimental group would evidence progress in vocabulary development as measured by the Peabody Picture Vocabulary Test significantly superior to that of the comparison group. The data did not confirm this hypothesis. Table XII in the appendix gives the means, variances, and level of significance for the vocabulary MA and IQ for both groups.

Initially, the experimental group had a mean vocabulary MA of 3.77 while the comparison group had a vocabulary MA of 3.22. There was no initial statistical difference between the groups. Both groups were functioning below CA expectancy; the experimental children were seven months below, while the comparison children were 14 months below.

At the time of posttesting, both groups evidenced gains; however, the difference between posttest scores or gain scores was not significant. The mean Peabody Vocabulary MA of the experimental group at the time of posttesting was 4.80 and that of the comparison group, 4.58. Both groups continued to function below CA expectancy; however, at this time the experimental children were three months below while the comparison children were now only five months below.

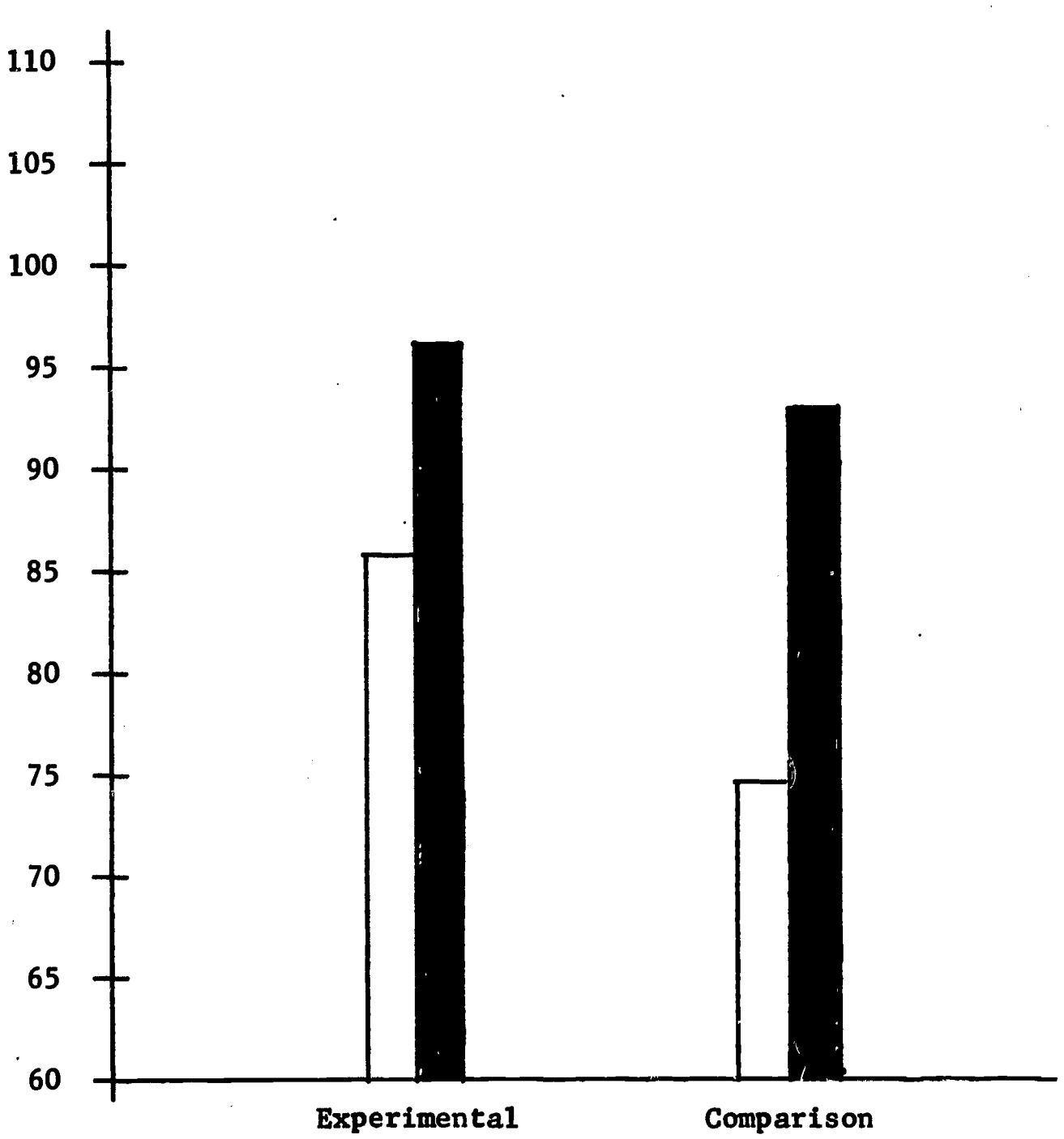
In terms of IQ, there was an initial trend in favor of the experimental group; pretest scores showed that the experimental subjects had a mean Peabody Vocabulary IQ of 86.18, while the mean of the comparison subjects was 75.28. Eight months later the vocabulary IQ of the experimental group rose to 96.11, while that of the comparison group increased to 93.17. The experimental and comparison groups gained 9.93 and 17.89 points respectively. Although the hypothesis predicted a greater gain for the experimental group, the final data revealed a trend in favor of the comparison group. Figure VI on page 57 presents these data.

The initial evaluation indicated that the experimental subjects were

Figure VI

Peabody Vocabulary IQ Gains for

The Experimental and Comparison Groups



Experimental		Comparison	
Pretest IQ	86.18	Pretest IQ	75.28
Posttest IQ	96.11	Posttest IQ	93.17
Gain	9.93	Gain	17.89

achieving at a statistically higher level in vocabulary development, but this difference was not sustained during the interim. The greater net gains evidenced by the comparison subjects modified the initial advantage of the experimental subjects and resulted in no significant differences between the groups at the time of posttesting.

It is difficult to offer a logical explanation for the growth of the comparison group. The depressed nature of the comparison group's pretest performance may have lent itself more readily to remediation. At any rate, data from the Peabody test show that culturally disadvantaged children attending a preschool evidence a substantial increase in vocabulary development beyond what could be attributed to increased chronological age. Both groups increased their relative standing among like-aged peers on this measure of vocabulary development. It appears, then, that when these children are placed in a more stimulating environment which offers many new things to talk about, they become increasingly aware of the labels which the cultural language system attaches to objects and events.

Hypothesis IV: Visual Perceptual Development

An evaluation of the test results supports the hypothesis that the experimental subjects would evidence progress in visual perception as measured by the Frostig Developmental Test of Visual Perception significantly superior to that of the control subjects. Table XIII in the appendix presents means, variances, and significance levels of the Frostig Perceptual Quotients for the experimental and comparison groups on pretest, posttest and gain scores.

There was an initial trend in favor of the experimental group who obtained a perceptual quotient of 80.81, while the comparison group achieved a perceptual quotient of 72.36. During the course of the program substantial growth was evidenced by both groups. The perceptual quotient of the experimental group rose to 99.07, a gain of 18.26, while that of the comparison group rose to 85.67, a gain of 13.31. Posttest data indicated a significantly superior performance on the part of the experimental group. There was no significant difference between the gain scores of the two groups.

The experimental group not only maintained the initial difference in level of functioning, but, more important, they enhanced the statistical magnitude of this difference. The greater gains experienced by the experimental subjects give a strong indication that a highly structured preschool program which specifically includes activities to foster perceptual development is more conducive to the development of these skills than is the more traditionally oriented preschool program. Figure VII on page 60 presents bar graphs illustrating pre- and posttest performances of both groups.

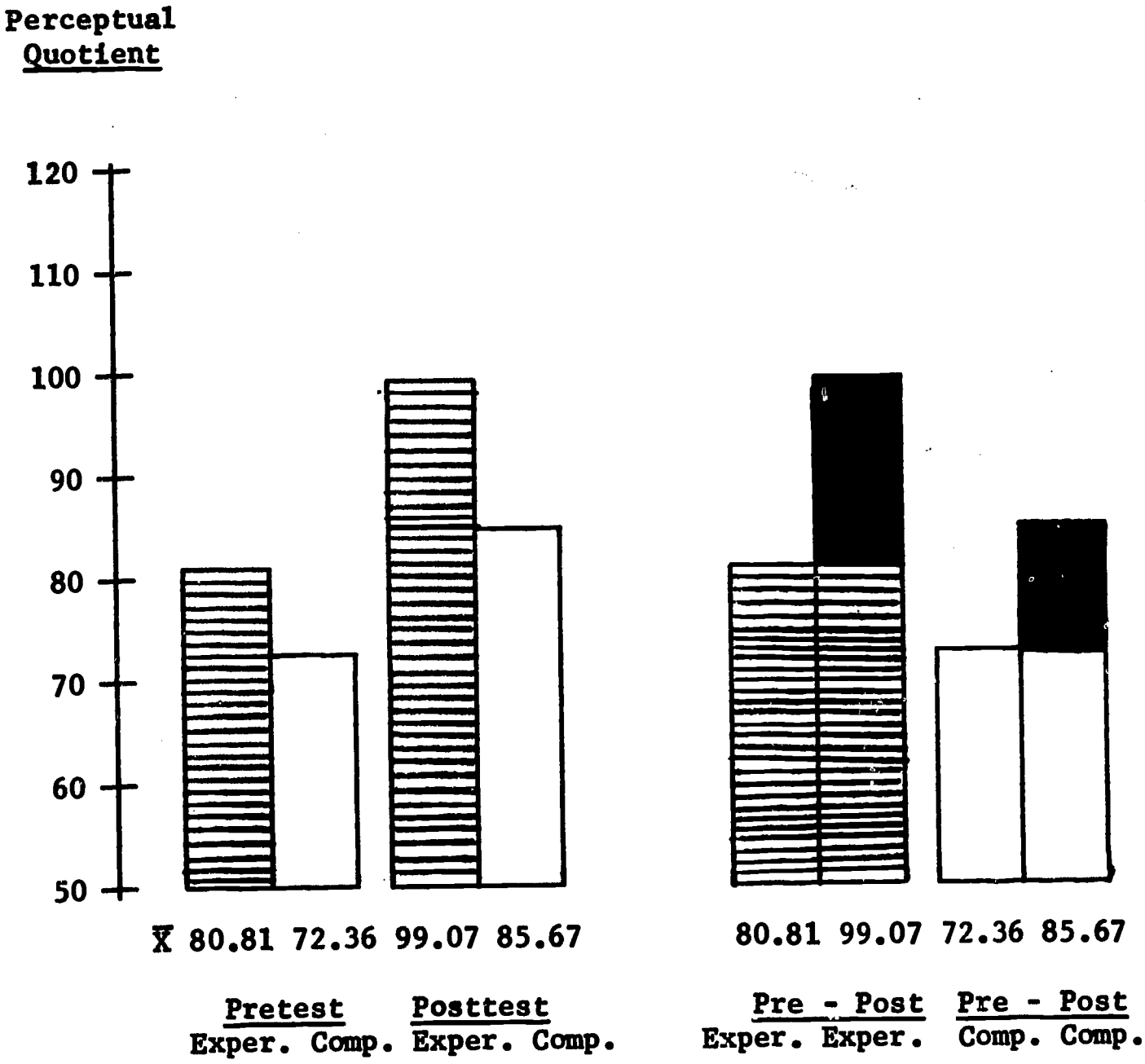
Frostig suggests that a perceptual quotient of 90 be used as a cut-off point. Children who score below that point should receive special training. According to this criterion, 74% (20) of the experimental subjects and 85% (22) of the comparison group would have initially required remediation in perceptual development. At the completion of the program, the number of ex-

Figure VII

Pre- and Posttest Performances of

The Experimental and Comparison Groups on

The Frostig Developmental Test of Visual Perception



perimental subjects needing such services had been reduced to 19% (5) while 60% (17) of the comparison subjects still fell below 90. Since retardation in perceptual development may have a seriously debilitating effect upon a child's ability to function in the school setting, the results obtained in the experimental program are most encouraging. If these gains can be maintained, they hold a potential for more effective and efficient learning for the culturally disadvantaged child.

Hypothesis V: School Readiness

It was hypothesized that at the completion of the seven-month program interval the experimental subjects would score higher on tests of school readiness than the comparison group. This expectation was confirmed since the experimental group's performance was significantly higher on the three scales of readiness presented on the Metropolitan Readiness Tests. The experimental group's superiority in number and total readiness reached a .001 level of significance, and their superiority in reading readiness was established at the .05 level of significance. A comparison of the Metropolitan Readiness Tests results for both groups are found in Table XIV in the appendix.

A general overview of the data tends to support consistently the superiority of the experimental group in basic readiness skills. These data are to be found in Table VII on page 63. On reading readiness performance 26% (7) of the experimental subjects achieved an Average rating while 18% (5) were classified as Poor Risks. In the comparison group only 18% (5) of the subjects earned an Average rating and 30% (8) were rated as Poor Risks. On the number readiness section of the test 15% (4) of the experimental subjects achieved a High Normal rating while none of the comparison subjects fell into this category. An Average rating was earned by 48% (13) of the experimental children, while only half that number of comparison children fell into this category. Only 11% (3) of the experimental subjects earned ratings that placed them in the Poor Risk category, while more than three times as many comparison children fell into this category. An examination of total readiness status revealed that one experimental subject earned a High Normal rating while no comparison subject fell into this category. Three times as many experimental children earned an Average rating. Six times as many comparison subjects were rated as Poor Risks.

The comparative performances of the two groups support the premise that a highly structured preschool program is more conducive to the early development of

Table VII

Comparative Readiness Status of Experimental and Comparison Subjects At the End of This Evaluation Period

Reading Readiness		Number Readiness		Total Readiness		Readiness Status
Experimental	Comparison	Experimental	Comparison	Experimental	Comparison*	
						Superior
		15% (4)		3% (1)		High Normal
26% (7)	18% (5)	48% (13)	23% (6)	23% (6)	7% (2)	Average
56% (15)	52% (14)	26% (7)	40% (11)	67% (18)	48% (13)	Low Normal
18% (5)	30% (8)	11% (3)	37% (10)	7% (2)	44% (12)	Poor Risk

*Metropolitan Test data on one comparison subject could not be obtained, which resulted in equated N's of 27 subjects for both groups.

basic readiness skills in children. These findings, however, should be tempered with at least two major considerations. In the first instance, it should be noted that the majority of the children in both groups achieved a reading readiness status of Low Normal or below (74% in the experimental and 82% in the comparison group). The findings suggest that at the age of five these children could experience only minimal success in learning to read. A second major factor to be considered is that no adequate instruments presently exist for the measurement of achievement at this age level. While it is encouraging to note the degree of success achieved by these preschool children on the Metropolitan Readiness Tests, the tests are designed primarily for use in late kindergarten or early first grade.

Chapter VII

Representative Case Studies

A review of the case studies of these children provided additional information concerning their intellectual and language development. These case studies used both qualitative and quantitative data. Psychological reports, teacher observations, reports from agencies, and parent interviews were the main sources of the qualitative data. The test battery provided the quantitative data.

In general, the deficits of these children were:

1. Inadequate language development as evidenced by limited vocabulary and tendency to respond in gestures, single words, or disconnected phrases. These children had not acquired the language patterns typical of more advantaged four-year-olds.
2. Inadequate skills in processing information as indicated by limited ability to ask questions, to discriminate, to classify, to see sequential relationships, to make inferences, to draw conclusions, and to transfer learnings. Poor listening skills and short attention spans further limited their information processing skills.
3. Inadequate self concept as manifested by a hesitancy to participate in group activities, a withdrawal from unfamiliar situations, and a reluctance to try new tasks.
4. Inadequate social and emotional adjustment as noted in hostile and aggressive behavior or extreme withdrawal.
5. Inadequate motivation to pursue learnings essential for subsequent academic progress as shown by an initial lack of interest

in books, in other educational activities, and in obtaining and organizing information.

These deficits are associated with the low socioeconomic backgrounds of these children. Their homes are characterized by:

1. Crowded living conditions. Generally too many persons occupy too few rooms. This condition discourages verbal interaction and individualized attention from adults. The child often protects himself from extraneous noises and confusion by not attending, but later good listening skills will be demanded of him.
2. Broken and/or disorganized homes, resulting in lack of adequate supervision of children. Such conditions promote insecurity in the child and deprive him of the consistent handling and intellectual stimulation that is conducive to growth.
3. Poor language model. The parents themselves do not present their child with an adequate language model; therefore, the child is poorly equipped to cope with the language expectations of the school. In addition, the child tends to be talked "to" instead of "with." Sharing ideas and experiences is not encouraged.
4. Meager intellectual stimulation. While these parents seem to recognize that it is important for children to get an education, they do not seem to understand what they can do in the home to prepare the child for school. Crayons, children's books, and educational toys are not found in these homes. The parents do not have the "know-how" to use inexpensive and common household items to intellectually stimulate the child. Neither do they seem to see the value of helping the child profit from such

simple experiences as a trip with the mother to the grocery store. Instead of providing rewards or reinforcement for types of behavior which teachers would view as necessary for school success, these parents may ignore signs of intellectual curiosity.

The following two case studies were selected as representative of the culturally disadvantaged preschool children enrolled in the experimental program. Although the statistical analysis of the data has rendered the most accurate and objective assessment of the accomplishments of the experimental program, such an analysis, by reason of its concern with group results, does not communicate the impact of the program upon individual children. Representative case studies illustrate the meaningfulness of the program in terms of an individual child's intellectual and academic growth.

The Case of Grant

I. Background Information

Grant, a Negro boy, was three years and eleven months of age when he entered the experimental program. He was small for his age. Prior to Grant's birth his parents had lived in Mississippi where his father had completed the ninth grade and his mother, the eighth. His father is employed as a truck driver for a junk-yard concern, and his mother earns some money by doing housework. Grant has a twin brother and three other brothers, aged seven years, six years, and four months. The family rents an old and poorly-kept three-room house in a very deteriorated neighborhood. The home is crowded, shabby, and meagerly furnished. The interior of the home is kept reasonably clean and neat. Except for a TV set and a radio, the home contains few intellectually stimulating items. Grant's mother commented: "A book doesn't last long around here. Turn your back, and the pages are torn

out." In addition to Grant's immediate family, the home is also occupied aunt, his mother's sister.

Grant's mother had difficulty recalling the various aspects of his developmental history but reported a normal pregnancy and birth. Although she was unable to remember the ages at which Grant sat alone and walked, she did remember that he was "over a year old" when he started to talk and that she had difficulty understanding him. A medical examination revealed Grant to be in good health except for a tendency to be subject to frequent colds. His teeth had several caries at the time of his entry into nursery school.

At home, Grant and his siblings have few toys or playthings. He reportedly enjoys television cartoons and amuses himself by getting involved with whatever may be going on at a particular time. The mother seemed rather unconcerned about her children's lack of toys but seemed anxious that they do well in school. She did not feel that Grant presented any difficult disciplinary problems but found his "running around in the house" a source of irritation as was his almost nightly enuresis. She controlled the child chiefly by the administration of spankings, although on occasion she sent him to bed as punishment. Grant's mother was very vague concerning her aspirations for the child's future but seemed concerned that the child do something he wants. The general impression was that Grant's parents were genuinely fond of their children but, partly as a result of their own limited experiences and partly as a result of the considerable efforts required to meet the financial burdens of rearing a large family, were able to do little more for their children than to provide for their physical needs.

II. Status at the Beginning of the Program

Grant's IQ on the Binet was 78 when he entered the experimental program. His mental age of three years and one month lagged ten months behind his chronological age. According to the classification of intelligence quotients

on the Binet, his intellectual performance placed him in the borderline mental defective range. The psychologist examining him was of the opinion that factors associated with rather severe cultural deprivation exerted a large influence on Grant's IQ score and that as a result of involvement with a better cultural environment, the child would show gains in his measured intellectual functioning. His poor expressive ability and problems in speech articulation were very noticeable.

The Peabody Picture Vocabulary Test yielded a mental age of three years and two months and an intelligence quotient of 84. As a measure of Grant's vocabulary, this test placed him at the 15th percentile. The picture gleaned from this test, then, was that of a child showing a considerable lag in his ability to understand spoken language.

Grant's perceptual quotient, as measured by the Frostig Developmental Test of Visual Perception, was 87. This perceptual quotient is equivalent to a percentile rank of 20 and indicates below average functioning in this area of development. Inspection of performance on the individual subtests of this instrument showed that Grant's greatest weaknesses were in the areas of discriminating figure-ground relationships, recognizing the constancy of shapes in varying contexts, and analyzing simple spatial forms and patterns. Grant performed adequately on subtests involving eye-motor coordination and the discrimination of rotated figures. These latter strengths should be assets in the development of well-directed eye movements for reading, eye-hand coordination for writing, and in the discrimination of letter forms necessary in reading.

Surprisingly, Grant's total language age, as measured by the Illinois Test of Psycholinguistic Abilities (ITPA), was three years and seven months, only four months below his chronological age. His performances on this test were characterized by a considerable degree of heterogeneity, illustrating

very definite assets in some areas of psycholinguistic functioning and salient deficiencies in others. In the areas of Auditory-Vocal Association (i.e. ability to relate spoken words in a meaningful way, as in analogies), Auditory-Vocal Sequencing (i.e. auditory memory), Visual-Motor Association (i.e. the ability to relate meaningful visual stimuli), and Auditory Decoding (i.e. understanding what one hears), Grant performed at a level consistent with or above what would be expected of a child his age. On the other hand, he showed rather severe deficits on the following subtests: Auditory-Vocal Automatic (i.e. the grammatical aspects of language), Motor Encoding (i.e. expressing ideas in gestures), and Vocal Encoding (expressing ideas in words).

Grant's performance on the Templin-Darley Tests of Articulation emphasized his severe articulation problem. He obtained only six items correct out of fifty; an average child his age would obtain 34 correct.

The psychologist who evaluated Grant wrote that he was an easy child with whom to establish rapport and that, although he lacked persistence in his attempts to solve problems, he appeared to be average in social confidence.

Thus, at the beginning of the program, Grant's level of intellectual functioning was what is commonly termed "borderline mental defective." His verbal expressive ability was poor as was his speech articulation. Developmentally, he was retarded in his understanding of language. Perceptual lags were noted especially in areas involving figure-ground relationships, recognition of constancy of shapes, and analyzing spatial forms and patterns. In terms of communication skills, Grant displayed retardation in the use of the grammatical constructions of language and in the expression of ideas in words and gestures.

III. Educational Program

Each weekday morning, Grant attended the experimental nursery program for two hours and fifteen minutes. For all children in the experimental group, the

curriculum was highly structured, and each child was exposed to the same content curriculum emphasizing mathematical concepts, language arts, science, and social studies. However, within each content area and during each learning period, the teacher structured each child's specific learning activity to use his strengths in ameliorating the skills in which he was deficient. Grant was frequently asked to relate experiences, and the teacher helped him seek out and use a variety of modes to express himself. He learned to dramatize sections of a story and to describe the hero of the story. Correct language patterns were taught in a variety of ways, one of which included use of a tape recorder. For example, the teacher would ask Grant two or three questions and his responses were recorded. Grant learned to talk in complete sentences. The teacher-child interaction would proceed in a manner such as:

T.: "What's your name?"

Grant: "My name is Grant."

T.: "How old are you?"

Grant: "I am three years old."

T.: "Where do you live?"

Grant: "I live in Champaign."

Concepts or relations such as long and short, fat and thin, and big little were illustrated with concrete objects and discussed. Perceptual-motor tasks from the Frostig Perceptual Training Program were given to Grant to help him ameliorate weakness. The teacher used every opportunity to help Grant overcome particular difficulties. For example, the napkins used at juice time were cut into different shapes to provide additional opportunities for Grant to identify geometric forms.

The teacher noted that initially Grant had a very limited knowledge of the names of objects, shapes, and colors. However, he learned quickly. At first, Grant tended to reply to others by means of nods or with a minimum of

poorly connected words. Even in his directed play activities he was encouraged to express himself correctly. Prior to his entry in the program, Grant had no experience with books or magazines of any type. Books did not interest him, and his lack of familiarity with them was demonstrated by his inability to hold a book right-side-up or to distinguish the front from the back. He did not know how to turn the pages to look at a book. His skills greatly improved; and, as the teacher explained and discussed stories and pictures of interest, he developed an appreciation for the information and pleasure books have to offer.

The teacher encouraged Grant's mother to remind Grant to speak in complete sentences and to stimulate him to talk more. The mother commented that the five children already talked too much and that she had little time to supervise any of his learning activities. However, it should be noted that, although Grant's mother apparently lacked both the time and the ability to offer intellectual stimulation, she seemed genuinely appreciative that Grant could attend the nursery school and was concerned that he "behave in school."

IV. Status After Experience in the Experimental Program

At the time of posttesting, Grant showed a seventeen-month gain in mental age score as measured by the Binet. His IQ, formerly 78, was now 107, an increase of 29 points. Figure VIII on page 73 presents Grant's measured age scores on the Binet, Peabody, and ITPA. Originally, this child's Binet performance placed his intelligence within the borderline mental defective range; his posttest performance indicated that he was functioning at the high end of the average range.

On the Peabody Picture Vocabulary Test, his intelligence quotient rose only two points, from 84 to 86.

Grant seemed to profit significantly from the perceptual training, for

Figure VIII

Grant's Age Scores on the Binet, Peabody, and ITPA

Binet MA	Peabody MA	C.A.	Age Score	ITPA - LANGUAGE AGE									Total ITPA Language Age
				REPRESENTATIONAL LEVEL						AUTOMATIC-SEQUENTIAL			
				Decoding		Association		Encoding		Automatic	Sequential		
				1	2	3	4	5	6	7	8	9	
				Auditory	Visual	Auditory Vocal	Visual Motor	Vocal	Motor	Auditory Vocal	Auditory Vocal	Visual Motor	
			8-0										
			7-6										
			7-0										
			6-6										
			6-0										
			5-6										
			5-0										
			4-6										
			4-0										
			3-6										
			3-0										
			2-6										

Below norms

Note: Dotted line = Pretest data
Solid line = Posttest data
Dotted horizontal line = CA at time of pretesting
Solid horizontal line = CA at time of posttesting

his perceptual quotient, as measured by the Frostig test, went from 87 to 123, a gain of 36 points. Formerly his perceptual skills ranked him at the 20th percentile; now these skills placed him at the 92nd percentile.

Large gains were also evidenced in several areas of communication, as demonstrated by the ITPA. In his three areas of initial weakness, Auditory-Vocal Automatic, Motor Encoding, and Vocal Encoding, Grant made gains of 23, 30, and 41 months respectively. His language age score of four years and three months on the Auditory-Vocal Automatic subtest was almost on a par with his chronological age of four years and six months. On the Motor Encoding subtest his language age was five years; on the Vocal Encoding subtest it was five years and eight months, both scores surpassing expectancy based on chronological age. Other impressive gains were 16 months in the area of Auditory-Vocal Association (i.e., relating spoken words in a meaningful way such as on an analogies test), 24 months on the Visual-Motor Sequencing subtest (i.e., reproducing a sequence of visual symbols from memory), and 23 months on Auditory-Vocal Sequencing (i.e., auditory memory). Grant showed a four-month loss on the Visual-Motor Association subtest, his language age having decreased to four years and four months from a previous four years and eight months. However, in the eight months that elapsed between pre- and posttesting, Grant's total language age on the ITPA increased from three years and seven months to five years and one month, a gain of eighteen months. Upon entry into the experimental program, Grant's total language age was four months below his chronological age; after seven months in the program his language age exceeded his chronological age by six months. His profile at the time of posttesting evidenced no psycholinguistic areas which might be considered deficits.

Grant showed little increase in his score on the Templin Darley tests; his score increased from six to ten correct out of fifty items. A child

of his age would on the average get a score of 36 correct. Speech articulation has remained a problem.

The teacher felt very encouraged by Grant's progress in the highly structured nursery school setting. Although one of the youngest and initially one of the most immature in the class, Grant adjusted readily and learned quickly. It was a joy to watch this child develop interest in areas which he initially completely ignored. Those who observed his significant progress shared the obvious pride he felt as he learned to tell a story, copy designs, express his ideas, dramatize the scenes in a story, make comparisons, note differences, and perform other activities which had been beyond his comprehension.

In summary, the changes in Grant's intellectual and learning skills within a seven-month period were truly remarkable. On the basis of his Binet performance he changed from a child classified as a borderline mental defective to one classified as high average. Whereas he initially evidenced psycholinguistic deficits in three areas, he no longer manifested any of these difficulties and evidenced a language age which exceeded his chronological age. His perceptual skills, initially definitely inferior to those of other children of his age, have developed to the extent that his percentile rank was 92. Grant still evidenced articulatory speech difficulties but his overall level of gains in intellectual and academic growth were remarkable. If this child maintains these gains as he progresses through his subsequent school years, his life will undoubtedly take a very different turn from that of a culturally disadvantaged child who has not had sufficient opportunity to overcome the handicap he has acquired through his membership in a deprived cultural subgroup.

The Case of Mia

I. Background Information

Mia is a four year, nine month old Negro girl who is the seventh of eight children in her family. Prior to her birth, both parents lived in Mississippi. The father works for a taxicab company while the mother confines her duties to the home. The parents have had comparatively little schooling, the father completing the fourth grade and the mother, tenth grade. The family rents a six-room home in a government housing project for families of low income.

Mia's mother remembered few of the details of Mia's early development but felt that the child progressed in the same manner as most other children. Medical examination prior to the child's entrance into the nursery school program revealed no health difficulties.

The interior of the home is messy, overcrowded, and noisy, with little opportunity for privacy on the part of family members. Mia enjoys helping her mother around the house with such chores as drying the dishes and sweeping. She is usually disciplined by spankings or being sent to bed. The home contains little in the way of "extras" as far as furniture, cultural items, or toys are concerned. Mia amuses herself by playing with her three-year-old brother and watching television.

II. Status at the Beginning of the Program

At the time of initial testing, Mia's mental age on the Binet was four years and one month. Since she was chronologically four years and nine months of age at this time, her measured IQ was 85. Such an intelligence quotient indicates slow learning ability. Mia's general experiential impoverishment was evident on her Binet performance as shown by her difficulty identifying common objects by name and in putting pieces together to make a picture.

The child was considerably handicapped in her ability to understand language as indicated by a mental age of only three years on the Peabody Picture

Vocabulary Test, with a vocabulary IQ of 61. Her performance on this test yielded a percentile rank of two.

Retardation of functioning was manifest in the area of perceptual development as well. On the Frostig Developmental Test of Visual Perception, Mia's perceptual quotient was only 68, yielding a percentile rank of two. Her only adequate performance on this test was in the area of discriminating rotated figures. She had considerable difficulty on tasks involving eye-motor coordination, figure-ground relationships, recognition of shape constancies, and analyzing simple forms and patterns.

While Mia's total psycholinguistic functioning (a language age of four years and zero months) as measured by the Illinois Test of Psycholinguistic Abilities (ITPA) was only slightly below her mental age, the profile of her performance on the separate subtests of this instrument was markedly uneven, indicating areas of definite assets and areas of considerable deficiency. The child had the most difficulty in the area of Visual-Motor Sequencing, that is, with tasks requiring her to reproduce from memory sequences of symbols which had been presented visually. Her language age in this area fell below the norms. Other deficits included the ability to express herself verbally (Vocal Encoding subtest), the use of language in its grammatical aspects (Auditory-Vocal Automatic subtest), the interpretation of visual stimuli (Visual Decoding subtest), and the ability to recall immediately material presented auditorily (Auditory-Vocal Sequential subtest). On the other hand, Mia scored near her chronological age in expressing ideas motorically (Motor Encoding subtest), selecting from among pictures the ones meaningfully related (Visual-Motor Association subtest), and slightly above her chronological age in understanding stimuli presented through the auditory channel (Auditory Decoding).

Mia had no articulation difficulties and obtained 43 out of 50 items correct on the Templin-Darley Tests of Articulation. On the average, children of

her age score about 36 on this test.

At the time of her entry into the program, then, Mia was functioning at the intellectual level of a slow learner. Her vocabulary was markedly retarded as were her perceptual skills. Her pattern of psycholinguistic abilities generally fell below her chronological age and indicated several areas of marked deficit.

The psychologist examining Mia noted her to be a friendly and outgoing child. She was further characterized as having a short attention span and being easily distracted. Her speech was loud and immature and marked by little use of sentences. Mia seemed to need personal attention and had difficulty conforming to behavioral restrictions. In the face of prospective failure, she tended to withdraw from the task and to become engaged in extraneous activities. The child seemed accustomed to letting her needs and wants be known immediately and expected immediate attention from adults instead of delaying matters for more appropriate occasions.

III. Educational Program

A large number of school activities were designed to increase the child's vocabulary. Mia made unusual progress in this area, and her teacher commented that she "became almost insatiable in her demands for new words." Considerable time was spent in structured activities relating to sentence structure, use of complete sentences, and correct grammatical usage. Mia's teacher noted a considerable transfer of this skill to Mia's spontaneous conversation. The child greatly enjoyed the many activities planned to increase her motor coordination and the perceptual training tasks. Since Mia was strong in auditory skills, these skills were used to help strengthen her performance in areas involving visual stimuli. She learned to notice and describe the details of pictures. The teacher helped her develop her visual memory by showing her objects arranged in a specific order while verbally describing them. The visual model

was then removed, and Mia was required to arrange the objects in the original order.

Initially, Mia presented several behavior problems. She was sulky, moody, lacking in self-control, temper-prone and had a very short attention span. When she became angry, she would strike other children, refuse to join a game, sulk or glower in the doorway, and refuse to sit at a table. As the psychologist had predicted, if Mia were presented with a task which she did not immediately comprehend or which she felt she could not perform, she would become angry and refuse to try. But Mia made remarkable gains when the teacher made attention and praise contingent upon desirable behavior and for the most part ignored the child's undesirable reactions. Mia learned to lower her shouting voice. Within a few months, Mia was one of the most cooperative youngsters in her group of five, acting as a stabilizer and frequently setting the correct example in behavior and in following directions.

Mia showed an upsurge of negative behavior in mid-winter concurrent with the divorce of her parents and the subsequent event of her father's leaving town. However, the behavioral incidents were transitory and lasted only a few weeks.

IV. Status After Experience in the Experimental Program

Figure IX on page 80 presents Mia's scores on the Binet, Peabody, and ITPA at the time of pre- and posttesting. Within the program interval, Mia's mental age on the Binet showed a seventeen-month gain, becoming more commensurate with her chronological age and yielding an IQ of 102. Whereas before her intellectual functioning was equivalent to that of a slow learner, it was now classified as average.

On the Peabody Picture Vocabulary Test the child gained three years and four months in mental age. Her intelligence quotient on this test rose from 61 to 114; her percentile rank increased from two to 81. Mia's understanding

Figure IX

Mia's Age Scores on the Binet, Peabody, and ITPA

Binet MA	Peabody MA	C.A.	Age Score	ITPA - LANGUAGE AGE									Total ITPA Language Age
				REPRESENTATIONAL LEVEL						AUTOMATIC-SEQUENTIAL			
				Decoding		Association		Encoding		Automatic	Sequential		
				1	2	3	4	5	6	7	8	9	
				Auditory	Visual	Auditory Vocal	Visual Motor	Vocal	Motor	Auditory Vocal	Auditory Vocal	Visual Motor	
			8-0										
			7-6										
			7-0										
			6-6										
			6-0										
			5-6										
			5-0										
			4-6										
			4-0										
			3-6										
			3-0										
			2-6										

Below norms

Note: Dotted line = Pretest data
Solid line = Posttest data
Dotted horizontal line = CA at time of pretesting
Solid horizontal line = CA at time of posttesting

of words was extremely retarded at the time of her entry into the experimental program; now she evidenced better than average skill in this area.

The child's perceptual skills likewise showed a considerable improvement. On the Frostig test, Mia's posttest perceptual quotient was 95, whereas her pretest quotient was only 68. Her percentile rank on this test rose from two to 38. She evidently profited considerably from the perceptual training experiences she received in the program, especially in the area of form constancy, spatial relations, and eye-motor coordination.

Mia's total language age on the Illinois Test of Psycholinguistic Abilities went from four years and zero months to five years and four months, manifesting a sixteen-month gain. In her three areas of greatest deficiency, Mia made impressive gains. Initially she had scored below the norms on the Visual-Motor Sequential subtest; at the time of posttesting, she earned a language age of four years and ten months, a score somewhat below her chronological age but nevertheless a score at least two years above her initial score. Her most dramatic gain was on the Vocal Encoding subtest. Her initial language age was three years and two months; her posttest score rose to seven years and nine months, a gain of four years and seven months. On the Auditory-Vocal Automatic subtest, her pretest language age was three years and six months; her posttest score was six years and one month, a gain of two years and seven months. Rather surprisingly Mia showed a decrease of 13 months from pre- to posttesting in the area of Motor Encoding which taps the ability to express ideas motorically. It should be mentioned, however, that children's performances frequently vary on this subtest, depending upon how much they involve themselves in the "game" of showing the examiner what they should <u>do</u> with various objects such as a telephone, a saw, etc. Since Mia's language age on this subtest was four years and seven months at the time of pretesting, it seems reasonable to assume that she has sufficient skill in Motor Encoding but simply did not

involve herself with these tasks during the posttesting. Mia's ITPA profile at the time of posttesting was still uneven; however, she was now functioning markedly above CA on Visual-Motor Association, Vocal Encoding, and Auditory-Vocal Automatic subtests. She was near or at CA on Auditory-Vocal Sequential, Visual-Motor Sequential, and Auditory-Vocal Association subtests. She continued to have deficits in the two decoding areas.

As before, Mia showed no difficulties in the area of speech articulation, as measured by the Templin-Darley Tests of Articulation. On the posttest the youngster obtained 49 correct out of the 50 items presented. Generally, children of her age obtain only about 38 items correct.

Some of Mia's desirable behavioral changes have already been discussed. In contrast to her earlier quarrelsome attitude toward her peers, Mia became most fond of helping other children. Frequently, she gave assistance to a child having difficulty with a classroom exercise. Mia developed a strong interest in storytime and books. Her memory for detail was excellent and she would "read" (repeat) a story she had heard read to her as she later leafed through the book. The teacher assessed her rate of progress in the acquisition of preschool skills as superior. She was alert, attentive, and usually anxious to please.

In January, when the teacher asked Mia's mother if she felt her child's behavior had changed in any way since she had started school, the mother rattled off quite a list: "Now she listens to what you tell her and does it better. She is better about dressing herself. She likes to get ready for school and look nice. She reminds me of what I forget. She is always telling her daddy what she learns." The mother also believed Mia had shown considerable improvement in the acquisition of new words and in speech development in general. Each day the child explained to her mother and grandparents what she had learned at school. Mia's mother noted that "Mia is so proud of her work."

The teacher, too, was pleased that for Mia, in contrast to many culturally disadvantaged children, school and learning had become a most interesting area of endeavor and one worthy of considerable motivational effort. In working with culturally disadvantaged children, the teacher has to cope not only with cognitive deficits but also with motivational deficiencies. The child's mother related a rather amusing little story which nicely illustrates how Mia changed during her enrollment in the experimental program. At supper, Mia was telling some of the things she had learned at school. Her older siblings were ridiculing her and saying that they knew all that. Mia replied: "I'm not telling you what you know, I'm telling you what I know."

Chapter VIII

Summary and Implications

Problem

The general problem with which this research is concerned is that of compensating for and ameliorating the learning deficits of four-year-old culturally disadvantaged children and accelerating their rate of growth in areas that will enable them to cope more successfully with the school tasks of first grade. The specific problem is the evaluation of two approaches for such compensation, amelioration, and acceleration. One approach provides a highly structured program using an instructional model as a guide in helping children process information in content areas and in ameliorating the deficits delineated by a careful psycho-educational study of each child. The other approach provides a more traditional nursery school program where socialization is one of the major goals and where learning takes place in a less structured, incidental, and informal manner. This report presents the preliminary findings of a projected five-year longitudinal study designed to compare the efficacy of various approaches to the education of culturally disadvantaged preschool children.

Organization of the Study

The subjects for this study were drawn from the preschool population of culturally disadvantaged children within the communities of Champaign and Urbana, Illinois. The subjects were selected on the basis of low socioeconomic status determined by fathers' occupation and place of residence. Subjects were required to be four years old by December 1 and to have had no previous preschool experience. Of the candidates referred for final screening, 60 were

selected for placement in the program. These subjects were blocked on the basis of intelligence quotient, race, and sex. The children were assigned randomly to four classes (two experimental and two comparison) of 15 children each. For reasons such as shifts in family residence, five subjects withdrew from the program. As a result, the final statistical evaluation was based on a population of 55 subjects (27 experimental and 28 comparison).

The subjects participated in the program for seven months. Both the experimental and comparison groups were divided into morning and afternoon classes which met for approximately two hours and fifteen minutes a day. The teacher-pupil ratio of each class was 1:5.

Statistical Treatment

The parametric procedure employed was the *t* test. The two-tailed tests of significance were used in the evaluation of the pretest data while the one-tailed test was used in evaluating the posttest performances and net gains achieved by the subjects. A .05 level of significance was used for accepting scores as significantly different and for confirming hypotheses. Evidence of trends in the data reaching a .10 level of significance were noted. The data were not only treated statistically for the group but also were incorporated in a case study approach. Thus, the relevant characteristics of the subjects are described as they relate to the group and as they appear in two representative cases.

Results

This study is based upon the general hypothesis that four-year-old culturally disadvantaged children participating in a highly structured preschool program designed to ameliorate deficits and accelerate their rate of growth in areas important for later school success will show progress sig-

nificantly superior to that of comparable children participating in a traditional nursery school program.

Hypothesis I: Intellectual Functioning

It was hypothesized that the experimental subjects would show progress in measured intelligence significantly superior to that of the comparison subjects. This hypothesis was confirmed. The mean Binet intelligence quotients of the two groups were initially comparable. The experimental subjects evidenced an IQ gain of 14.30 (95.96 to 110.26), while the comparison group achieved an 8.04 IQ gain (95.50 to 103.54). The IQ gains manifested by the experimental group were statistically superior to those of the comparison group at the .001 level of confidence as were the mean MA gains of the experimental group.

Hypothesis II: Psycholinguistic Abilities

The second hypothesis of this study was that the experimental subjects would evidence progress in psycholinguistic functioning as measured by the ITPA significantly superior to that of the comparison children. Although there was no instance in which the comparison group was significantly superior to the experimental subjects and all significant findings were in the direction originally predicted, the hypothesis was not clearly substantiated. Both groups made remarkable but comparable progress. Neither group failed to meet the interval expectancy of seven months on the total score or on any subtest.

The experimental subjects earned a mean posttest language age of 5.27 years, a gain of 1.15, while the comparison group's mean posttest language age of 4.91 resulted in a gain of 1.19. The experimental subjects were significantly superior to the comparison subjects on total posttest language age scores. However, this finding was confounded by the initial superiority

of the experimental group in total language age, even though this superiority failed to reach statistical significance. A comparison of gain scores revealed no significant differences; both groups achieved mean gains of 14 months during the seven month program interval.

Hypothesis III: Vocabulary Development

It was hypothesized that the experimental group would evidence progress in vocabulary development as measured by the Peabody Picture Vocabulary Test significantly superior to that of the comparison group. The data did not confirm this hypothesis. Initially, there was a trend in favor of the experimental group in terms of their Peabody IQ. At the time of posttesting, both groups evidenced substantial gains in vocabulary IQ. The experimental group gained 9.93 points, while the comparison group gained 17.89. The mean IQ of the experimental group was now 96.11 and that of the comparison group was 93.17. Although the difference between the posttest performances was not significant, the difference between the gains of the two groups revealed a trend in favor of the comparison group.

Hypothesis IV: Visual Perceptual Development

An evaluation of the data substantiates the hypothesis that the experimental subjects would evidence progress in visual perception as measured by the Frostig Developmental Test of Visual Perception significantly superior to that of the comparison subjects. Initially, there was a trend in favor of the experimental group. On the posttest the experimental group achieved a mean perceptual quotient of 99.07, a net gain of 18.25, while the comparison group earned a mean posttest quotient of 85.67, a net gain of 13.32. The experimental group not only maintained their initial superiority, but enhanced the statistical magnitude of this difference. Thus, the initial trend reached statistical significance ($p < .001$) at posttesting. No sig-

nificant differences were noted between gain scores.

Hypothesis V: School Readiness

It was hypothesized that the experimental subjects at the completion of the treatment period would score higher on tests of school readiness than the comparison group. This expectation was confirmed since the experimental group's performance was significantly higher on the three scales of readiness presented on the Metropolitan Readiness Tests. The experimental group's superiority was established at the .001 level of confidence in number and total readiness and at the .05 level of confidence in reading readiness skills.

Implications

The findings of the preliminary phase of this projected five-year-longitudinal study with four-year-old culturally disadvantaged children suggest that this highly structured educational program appeared to be more effective than a traditional nursery school program in accelerating intellectual functioning, perceptual development and readiness to cope with school tasks. Children in both programs made remarkable but comparable progress in the development of psycholinguistic skills. However, the true test of the program is contingent upon how well these children maintain these gains in subsequent years and how well they function in the academic setting of the public schools. An instructional model seemingly is effective in helping educators select appropriate ameliorative and developmental learning experiences for these children. A sequential program in visual perception seemingly promotes accelerated development among these children. Apparently, this highly structured program does foster general school readiness. The findings of the readiness tests were further verified by the gains achieved on the Binet intelligence scale, since this scale is purported to be the best single prediction of academic success.

While both groups made gains in psycholinguistic abilities which exceeded the interval expectancy of the program and while the experimental group showed superior progress on measures of intelligence, visual perceptual development, and school readiness, individual children continued to have deficits in certain areas. A program should be developed at the kindergarten level to ameliorate remaining deficits, to maintain the gains made at the four-year-old level, and to determine if further acceleration is possible at the five-year-old level.

A preschool program for the culturally disadvantaged, such as this experimental program, points out the need for a teacher training program which includes courses in understanding the milieu of the culturally disadvantaged, in diagnosing the learning deficits of this group of children, and in developing a curriculum which includes appropriate learning activities. A practicum in working with disadvantaged preschool children would be highly desirable.

Needed Research

It is desirable to evaluate this structured program with a similar program for three-year-old disadvantaged children to determine if earlier intervention results in greater success.

It is generally agreed that parents of culturally disadvantaged children need to acquire more effective ways of working with their children; therefore, various approaches for working with parents should be evaluated on a research basis.

Other approaches to preschool education for the culturally disadvantaged should be compared with this highly structured program. Among these might be a program based on Piaget's theories, a Montessori program, a program which entails integration of a small number of the culturally disadvantaged in preschools for middle and upper socioeconomic classes.

APPENDIX

Table I

Means, Variances and Significance Levels of Binet IQ and Binet MA for Experimental and Comparison Groups on Pretest, Posttest, and Gain Scores

Binet IQ

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	95.96	95.50	110.26	103.54	14.30	8.04
SD	9.99	11.83	9.50	13.05	6.59	8.10
Difference Between Means	.46		6.72		6.26	
t value	.16		2.18		3.14	
Sig. Level	NS		.05		.001	

Binet MA*

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	50.33	49.96	65.63	61.79	15.30	11.82
SD	6.03	6.78	6.33	8.00	3.41	-4.61
Difference Between Means	.37		3.84		3.47	
t value	.21		1.97		3.17	
Sig. Level	NS		.05		.001	

*Binet MA reported in months

Table II

Means, Variances and Significance Levels of Language Ages and Raw Scores of the Experimental and Comparison Groups Performances on the Auditory Decoding Subtest of the ITPA

Language Age

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	4.51	3.81	5.24	5.19	.73	1.38
SD	1.17	1.49	.85	1.26	.94	1.90
Difference Between Means	.70		.05		-.65	
t value	1.92		.18		1.59	
Sig. Level	.10		NS		.10	

Raw Scores

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	13.96	11.25	17.81	17.21	3.85	5.96
SD	5.07	6.28	3.52	5.01	4.55	7.44
Difference Between Means	2.71		.60		-2.11	
t value	1.76		.51		1.26	
Sig. Level	.10		NS		NS	

Table III

Means, Variances and Significance Levels of Language Ages and Raw Scores of the Experimental and Comparison Groups Performances on the Visual Decoding Subtest of the ITPA

Language Age

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	4.36	4.01	6.02	5.25	1.66	1.24
SD	.95	1.75	1.38	1.08	1.20	1.82
Difference Between Means	.35		.77		.42	
t value	92		2.32		1.02	
Sig. Level	NS		.05		NS	

Raw Score

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	7.77	6.93	12.07	10.11	4.30	3.18
SD	2.75	4.28	3.45	2.77	3.20	4.52
Difference Between Means	.85		1.96		1.12	
t value	.87		2.34		1.05	
Sig. Level	NS		.01		NS	

Table IV

Means, Variances and Significance Levels of Language Ages and Raw Scores of the Experimental and Comparison Groups Performances on the Auditory-Vocal Association Subtest of the ITPA

Language Age

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	3.96	3.68	5.13	4.72	1.17	1.05
SD	.86	1.28	.90	.95	.54	1.30
Difference Between Means	.28		.41		.12	
t value	.96		1.62		.44	
Sig. Level	NS		.10		NS	

Raw Scores

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	8.85	8.21	13.41	11.89	4.56	3.68
SD	3.61	4.08	3.06	3.67	2.12	3.66
Difference Between Means	.64		1.52		.88	
t value	.61		1.66		1.08	
Sig. Level	NS		.10		NS	

Table V

Means, Variances and Significance Levels of Language Ages and Raw Scores of the Experimental and Comparison Groups Performances on the Visual-Motor Association Subtest of the ITPA

Language Age

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	5.27	4.00	5.91	4.85	.64	.85
SD	1.29	1.38	1.23	1.02	2.05	1.37
Difference Between Means	1.27		1.06		-.21	
t value	3.55		3.49		.45	
Sig. Level	.001		.001		NS	

Raw Scores

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	12.67	9.14	14.41	11.39	1.74	2.25
SD	3.66	3.42	3.43	2.90	5.80	3.51
Difference Between Means	3.52		3.02		.51	
t value	3.69		3.52		.40	
Sig. Level	.001		.001		NS	

Table VI

Means, Variances and Significance Levels of Language Ages and Raw Scores of the Experimental and Comparison Groups Performances on the Vocal Encoding Subtest of the ITPA

Language Age

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\overline{X}$	3.29	2.99	4.83	4.59	1.54	1.60
SD	.83	1.15	1.19	1.13	1.16	1.45
Difference Between Means	.30		.24		.06	
t value	1.09		.77		.16	
Sig. Level	NS		NS		NS	

Raw Scores

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\overline{X}$	6.22	5.54	11.15	10.75	4.93	5.21
SD	2.83	3.12	3.61	3.34	3.56	3.93
Difference Between Means	.68		.40		.29	
t value	.85		.42		.28	
Sig. Level	NS		NS		NS	

Table VII

Means, Variances and Significance Levels of Language Ages and Raw Scores for Experimental and Comparison Groups on the Motor Encoding Subtest of the ITPA

Language Age

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	3.89	3.96	5.03	5.14	1.14	1.18
SD	1.24	1.57	1.18	1.41	1.66	1.48
Difference Between Means	-.07		-.11		.04	
t value	.17		.31		.11	
Sig. Level	NS		NS		NS	

Raw Scores

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	8.41	9.14	11.93	12.14	3.52	3.00
SD	4.03	4.02	2.62	3.50	4.68	3.84
Difference Between Means	-.74		-.22		.52	
t value	.68		.26		.45	
Sig. Level	NS		NS		NS	

Table VIII

Means, Variances and Significance Levels of Language Ages and Raw Scores of the Experimental and Comparison Groups Performances on the Auditory-Vocal Automatic Subtest of the ITPA

Language Age

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	3.47	3.48	5.03	4.60	1.56	1.12
SD	1.04	1.36	1.23	1.30	1.04	1.31
Difference Between Means	-.01		.43		.45	
t value	.03		1.27		1.39	
Sig. Level	NS		NS		.10	

Raw Scores

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	4.81	5.18	9.11	7.96	4.30	2.79
SD	2.94	3.15	3.27	3.44	2.80	2.95
Difference Between Means	-.36		1.15		1.51	
t value	.44		1.26		1.94	
Sig. Level	NS		NS		.05	

Table IX

Means, Variances and Significance Levels of Language Ages and Raw Scores of the Experimental and Comparison Groups Performances on the Visual-Motor Sequencing Subtest of the ITPA

Language Age

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	3.85	3.26	5.13	4.79	1.28	1.52
SD	.98	1.23	.58	1.15	.98	1.57
Difference Between Means	.58		.34		.24	
t value	1.95		1.39		.68	
Sig. Level	.10		.10		NS	

Raw Scores

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	6.26	4.36	11.07	9.54	4.81	5.18
SD	3.65	3.46	2.15	4.02	3.71	5.07
Difference Between Means	1.90		1.54		.36	
t value	1.98		1.76		.30	
Sig. Level	.10		.05		NS	

Table X

Means, Variances and Significance Levels of Language Age and Raw Scores of the Experimental and Comparison Groups Performances on the Auditory-Vocal Sequential Subtest of the ITPA

Language Age

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	4.43	4.30	5.53	5.16	1.10	.85
SD	.78	1.81	1.07	1.37	.90	1.44
Difference Between Means	.13		.37		.25	
t value	.33		1.12		.77	
Sig. Level	NS		NS		NS	

Raw Scores

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	15.00	13.29	19.26	18.07	4.26	4.79
SD	3.74	6.64	3.90	6.16	3.84	8.18
Difference Between Means	1.71		1.19		-.53	
t value	1.17		.85		.30	
Sig. Level	NS		NS		NS	

Table XI

Means, Variances and Significance Levels of Total Language Ages and Raw Scores of the Experimental and Comparison Groups' Performances on the ITPA

Language Age

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	4.12	3.72	5.27	4.91	1.15	1.19
SD	.54	1.26	.55	.74	.37	1.08
Difference Between Means	.40		.36		-.04	
t value	1.52		2.04		.19	
Sig. Level	NS		.05		NS	

Raw Scores

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	81.85	73.89	120.22	109.25	38.37	35.36
SD	19.54	30.55	16.58	23.15	16.29	24.01
Difference Between Means	7.96		10.97		3.01	
t value	1.15		2.01		.54	
Sig. Level	NS		.05		NS	

Table XII

Means, Variances, and Significance Levels of
Peabody Vocabulary IQ and MA for Experimental and Comparison Groups
On Pretest, Posttest, and Gain Scores

Peabody Vocabulary IQ

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	86.18	75.28	96.11	93.17	9.93	17.89
SD	17.31	26.66	14.34	15.13	15.88	26.44
Difference Between Means	10.89		2.93		-7.96	
t value	1.79		.74		1.35	
Sig. Level	.10		NS		.10	

Peabody Vocabulary MA*

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	45.26	38.64	57.70	55.04	12.44	16.39
SD	14.52	16.20	13.87	13.84	11.89	15.71
Difference Between Means	6.61		2.67		3.94	
t value	1.59		.71		1.05	
Sig. Level	NS		NS		NS	

*Peabody MA reported in months.

Table XIII

Means, Variances, and Significance Levels of
Frostig Perceptual Quotient for Experimental and Comparison Groups
On Pretest, Posttest, and Gain Scores

Frostig Perceptual Quotient

	Pretest Scores		Posttest Scores		Gain Scores	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
X	80.81	72.36	99.07	85.67	18.26	13.31
SD	9.75	23.23	12.76	10.86	13.98	25.45
Difference Between Means	8.46		13.40		4.93	
t value	1.75		4.19		.89	
Sig. Level	.10		.001		NS	

Table XIV

Comparison of the Metropolitan Readiness Tests Results

Of the Experimental and Comparison Groups

	Reading Readiness		Number Readiness		Total Readiness	
	Exper. Group	Comp. Group	Exper. Group	Comp. Group	Exper. Group	Comp. Group
$\bar{X}$	40.70	35.57	10.40	5.67	54.40	42.21
SD	9.16	10.94	4.50	3.73	14.02	14.34
Difference Between Means	5.13		4.73		12.19	
t value	1.88		4.25		3.19	
Sig. Level	.05		.001		.001	

Table XV

CONVERSION TABLE

Months	Tenths
1	.1
2	.2
3	.3
4	
5	.4
6	.5
7	.6
8	.7
9	.8
10	
11	.9

The above table was used to convert months to tenths of a year or tenths of a year to months.

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